9th ANNUAL PRESS DIES & STAMPINGS ISSUE

NOVEMBER, 1955

TOOLING and PRODUCTION

The Magazine of Manufacturing Management

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PRECISION ASSEMBLY

•

Hints for Making FORGING DIES

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BPA

There's a Standard **PUTNAM**

END MILL *for Your Job!*

Universal Application of Putnam End Mills (there are over 1200 standard sizes an types) permits users to select a standard end mill specifically designed for each job Many standard Putnam End Mills are of a type considered "specials" by othe manufacturers. Also, a wide range of sizes are available in every standard typ of end mill to provide complete application coverage.

From smallest to largest sizes — from fine intricate machining to rugged millin operations there is probably a standard Putnam End Mill that will mill your jol more efficiently. However, Putnam will also produce "special" end mills to you specs for those extra-special applications.

PUTNAM TOOL COMPANY

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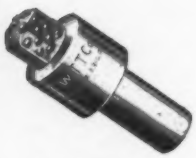
RADIUS FORMING TOOLS

"TRU-LINE" PROFILE DRESSING TOOLS



IMPREGNATED DRESSING TOOLS

STANDARD DRESSING TOOLS

"TRU-THREAD" THREAD DRESSING TOOLS

DIAMOND GRIT TOOLS FOR THREAD DRESSING

INDUSTRIAL DIAMONDS

1910 *Our 45th Anniversary* **1955**

in the American tradition

Twice a day a quick transformation overtook the old frame garage on John R Street, Detroit. At seven in the morning, the doors swung open, a spindly car chugged out and the garage became a busy little workshop. Sometime after dark, the car was driven back in and, for a few hours, the workshop was a garage again.

As a workshop, it had for us a very special significance—it was here that our Company came into being and set up the first local shop devoted exclusively to making industrial diamond tools.

But, far more important, it was the first place in the whole mid-west where industry could find a complete stock of fine industrial diamonds, imported direct to Detroit, and superior to stocks previously available only in New York.

Such convenience is taken for granted nowadays and the mails deliver thousands of our diamond selections yearly, but, in those days, it was an innovation and so useful that in almost no time at all, the old frame garage (which had cost $50.00) needed a 12-foot addition, (which cost another $50.00).

And, that was but the beginning. Today, our plants are the most modern in the industry and in the intervening 45 years our laboratories have pioneered many of the most significant innovations in diamond tool technology, including *Engineered Diamond Tools**.

Thus, in the good American tradition, a far-seeing idea, planted in the humblest beginnings, blossomed into a business that became national and international. And, this year, as we celebrate our 45th anniversary, we salute all of the many friends who helped to bring about this accomplishment.

Engineered Diamond Tools* are diamond tools ***engineered* to the job and ***guaranteed*** to do it.

WHEEL TRUEING TOOL COMPANY

58-3200 W. DAVISON AVE., DETROIT 38, MICHIGAN

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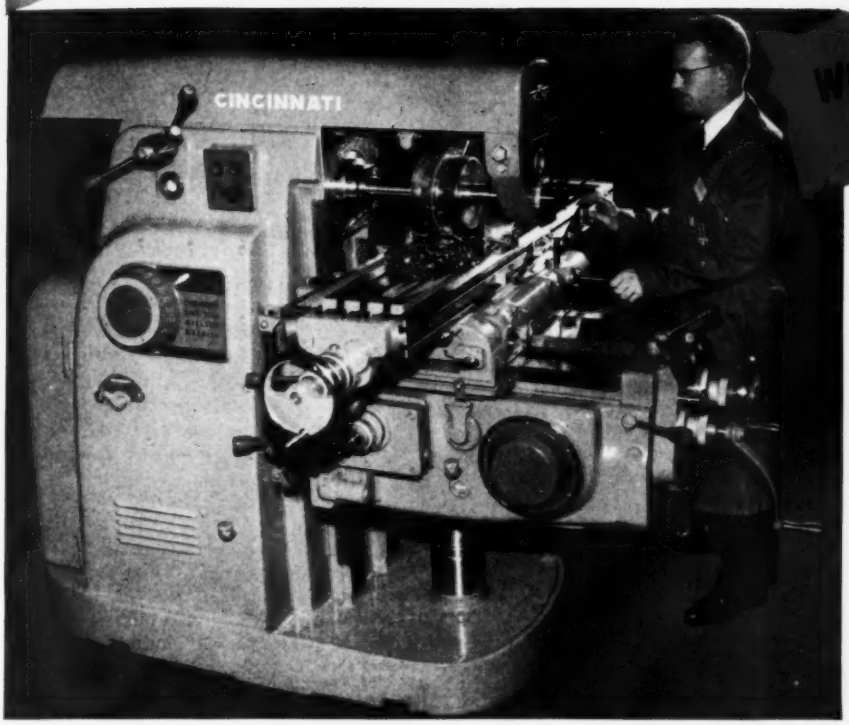
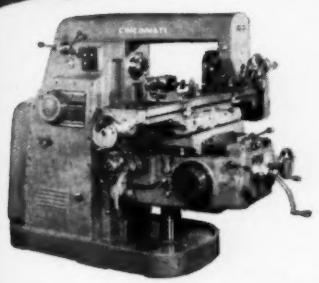
More Versatile Than Ever Before

THE NEW CINCINNATI DIAL TYPE MILLING MACHINES

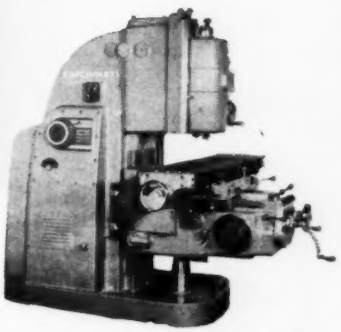
Will be a Big Hit in Your Shop



Automatic milling, using a simple one-way feed cycle on a New CINCINNATI Plain Dial Type Milling Machine with Automatic Table Cycles



The New CINCINNATI No. 2 Universal Dial Type Milling Machine



The New CINCINNATI No. 3 Vertical Dial Type Milling Machine

Ask anyone who was there. The four new CINCINNATI Dial Type Milling Machines were a big attraction at the recent Machine Tool Show. And the new Dial Types are bound to make a bigger hit in your shop . . . with the operator and foreman . . . with the methods engineer . . . with the new equipment analyst.

THE NEW DIAL TYPES are easier and safer than ever before to operate because of their dual push-button controls; complete safety from spinning hand cranks; large and conveniently located speed and feed dials.

THE NEW DIAL TYPES have the capacity to take on more work than ever before . . . higher ranges of speeds and feeds (up to 90" per minute feed rate); more than 50% increase in power; fully automatic table feed cycles if you want it; automatic backlash eliminator standard equipment.

THE NEW DIAL TYPES will satisfy the most critical equipment analyst . . . built-in, completely protected electrical controls; feed drive motor, unit construction and cradle type mounting of main drive motor reduce maintenance expense; operators can utilize their energy more productively; big variety of work, including high production jobs, can be assigned to *the New Dial Types.*

Everywhere you look you'll find new Dial Type features of value in your shop. There are many, many more than outlined here. You will get a better idea from the new catalog. Write for your copy of publication No. M-1915.

CINCINNATI

CINCINNATI

THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO

MILLING MACHINES • CUTTER SHARPENING MACHINES • BROACHING MACHINES • METAL FORMING MACHINES • FLAME HARDENING MACHINES • OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID

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for quick selection

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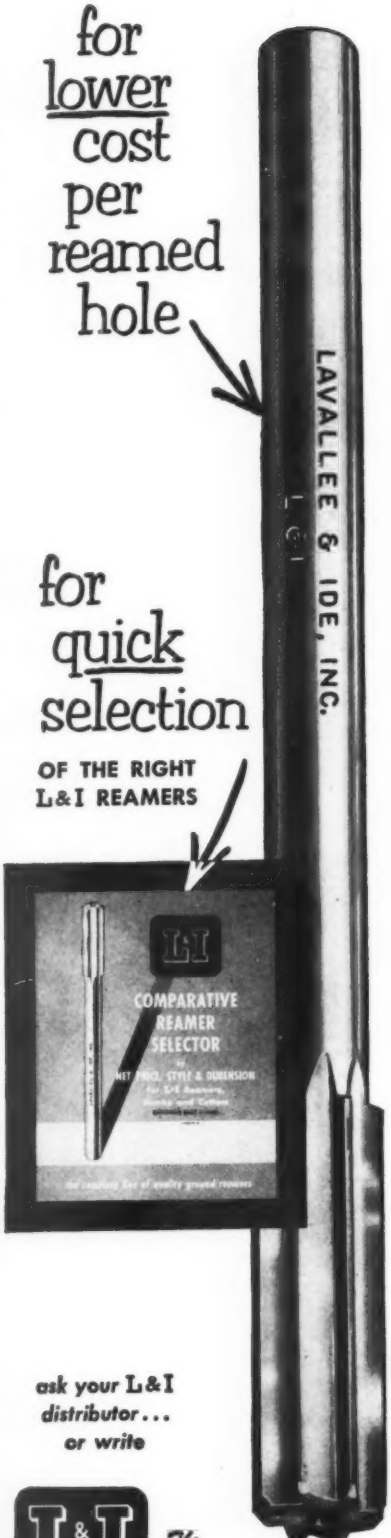

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TOOLING and PRODUCTION

The Magazine of Manufacturing Management

formerly Tool-Die-Machine PROGRESS 1934-1941
TOOL & DIE JOURNAL 1941-1951

George J. Huebner, Founder

VOL. XXI—No. 8 NOVEMBER, 1955

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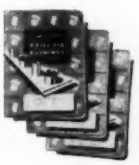

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at no extra cost to you . . .

NEW Quality Features on All AIR and HYDRAULIC CYLINDERS

Miller

CASE HARDENED CHROME PLATED PISTON RODS

On all Miller Air and Hydraulic Cylinders

Benefits To You

CASE-HARDENED Piston Rods (52-54 Rockwell "C") provide practically complete protection against damage from hammer blows, wrench-dropping, mishandling, and similar occurrences.

The HARD CHROME PLATING over the case-hardened rods protects against scratch-damage and rust.

"TEFLON" WIPERS

On all Miller Air and Hydraulic Cylinders

Benefits To You

"TEFLON" Rod Wipers and "TEFLON" Hydraulic Seals withstand temperatures from —100° F. up to 500° F. They are impervious to practically all known chemicals, including the fire-resistant, special, and standard hydraulic fluids in current use.

"TEFLON" HYDRAULIC ROD SEALS

On all Miller Hydraulic Cylinders only

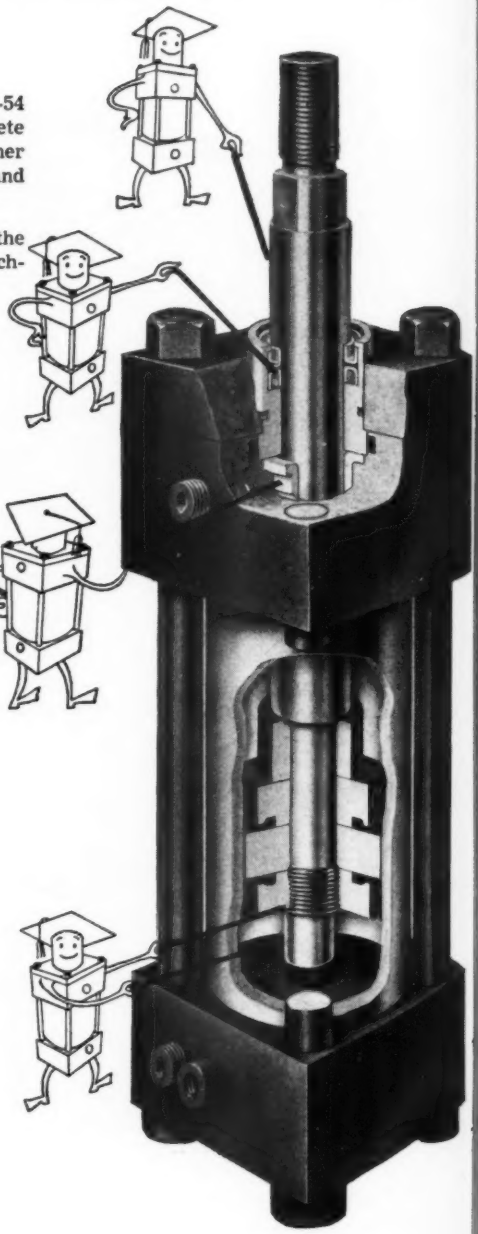
RUST RESISTANT SURFACES

On all Miller Air and Hydraulic Cylinders

Benefits To You

Highest quality Black Ferric Oxide Finish provides rust protection in air cylinder operation and on all cylinders during shipping and installation.

Cylinder heads, caps, mountings, pistons, followers, and the unplated portions of the piston rods have this finish. It is not recommended for water service.



WRITE FOR CYLINDER BULLETINS H-104 and A-105

Complete Miller cylinder line includes: air cylinders, 1½" to 20" bores, 200 PSI operation; low pressure hydraulic cylinders, 1½" to 6" bores for 500 PSI operation, 8" to 14" bores for 250 PSI; high pressure hydraulic cylinders, 1½" to 12" bores, 2000-3000 PSI operation. All mounting styles available.

Over 8,000 Different Cylinder Selections Available for Immediate Delivery. Write for Complete List.

EFFECTIVE DATES

These new Miller features will be provided at no extra cost after January 1, 1956—and at Miller's option prior to that date.

SALES AND SERVICE FROM COAST TO COAST

LEVELAND • YOUNGSTOWN • DAYTON • TOLEDO • CINCINNATI • COLUMBUS
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Miller

MILLER FLUID POWER CO.

2046 N. Hawthorne Ave. • Melrose Park, Il

AIR & HYDRAULIC CYLINDERS • BOOSTERS • ACCUMULATOR

Four More Miller Firsts . . .

Our "Report To Cylinder Users" was a simple statement of Miller Fluid Power Company's policy. In it was mentioned our dedication to the constant improvement of our products.

In line with this policy, here are new quality cylinder features that will eliminate many of the problems which you have reported to us.

Miller gave cylinder users one of its firsts when we chrome-plated all cylinder piston rods. Our reason was obvious. Chrome-plating gave every rod a mirror-like finish that no corrosive or abrasive dust could scratch. Miller made this chrome-plated, longer lasting rod standard. AT NO EXTRA COST.

Preventing Damage To Piston Rods

There were still plenty of hazards to which piston rods were subjected. A careless workman with a too handy wrench or pair of pliers meant a scored piston rod. A falling object striking the rod dented the softer metal beneath the plating of chrome. A jolt during assembly left its trouble-breeding mark. All of these nicked and scored the piston rods, damaging the whole assembly. Little could be done about this beyond repair and replacement—until the Miller announcement that from now on the piston rods on all cylinders—air and hydraulic—will be specially hardened (52-54 Rockwell C) to foil the carelessly used tool, the accident in transit or assembly, the falling object or unnoticed knock. Naturally, the new hardened rods will still be chrome-plated. Miller will now make this super quality an everyday standard. AT NO EXTRA COST.

Meeting The Challenge Of The New Demands On Seals

Rod seals on Miller hydraulic cylinders were constructed to be leakproof under all ordinary operating conditions. We guaranteed this. But we also stated in all our catalogues that for special conditions there must be special rod seals at an extra cost. Rod seals to withstand high temperatures had to be specially constructed. Where fire resistant fluids were used, special rod seals had to be provided at an extra cost. Because many fire resistant fluids destroy ordinary packing.

The present widespread use of these fluids and excessive heat generation from high speed operation and increased loads have resulted in reports of trouble on cylinders where ordinary seals were subjected to these hazards. These reports were not received with joy at Miller, even when the fault was definitely not ours. We don't like to have trouble develop on any Miller installation under any condition. So we decided to do something about these problems of the rod seals.

A new expensive material known as "TEFLON" has been developed for use as seals. This material is impervious to temperatures from —100° to plus 500° F. It resists all known fluids, even the most destructive of the fire resistant fluids. Now, every piston rod on every Miller hydraulic cylinder will be fitted with "TEFLON" Piston Rod Seals. AT NO EXTRA COST.

In addition, all rod wiper seals on all Miller Air and Hydraulic cylinders will be of the same chemical-and-heat resisting Teflon material.

These Teflon rod wiper seals will be standard on every Miller cylinder, regardless of how and where it will be used. This is Miller's way of doubly insuring cylinder users against all possible hazards. AT NO EXTRA COST.

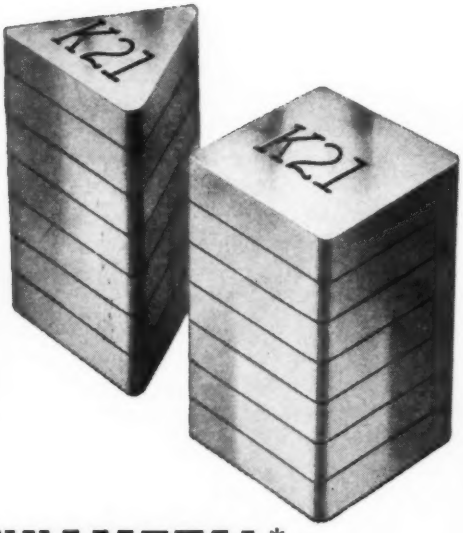
Protection Against Rust

The barrels of Miller air cylinders are of moisture-resistant brass. The barrels of hydraulic cylinders, since they run in oil, are protected once they are installed and in operation. Beyond this all cylinder parts are subject to rust and corrosion. Such exposed parts as heads, caps and tie rods quickly show the unsightly evidences of rust. At least this has been so up till now. But all this is now being corrected.

From now on Miller will protect all these parts on both air and hydraulic cylinders with a black oxide process in which a chemically created ferric oxide coating is developed on the surface of the metal to protect against rust and other corrosion. Every Miller cylinder sold will carry this added protection. AT NO EXTRA COST.

These four new Miller firsts are added to the many firsts established by Miller. Like other Miller firsts which created new departures in cylinder design and construction, these are now offered as Miller standard specifications. AT NO EXTRA COST.

MILLER FLUID POWER COMPANY
2046 N. Hawthorne Avenue
Melrose Park Illinois



THESE TWO RECENT KENNAMETAL* DEVELOPMENTS HELP TO MEET TODAY'S HIGH-SPEED PRODUCTION NEEDS

The profit advantages of today's high-speed automatic cycling machines for metal cutting are lost when tools wear rapidly—need frequent regrinding—or are cumbersome to index.

Kennametal recently introduced two new developments to help give you continuous machine performance, and to help step up profits in your steel-cutting operations. These developments are Kendex*† Button Tooling and Kennametal Grade K21.

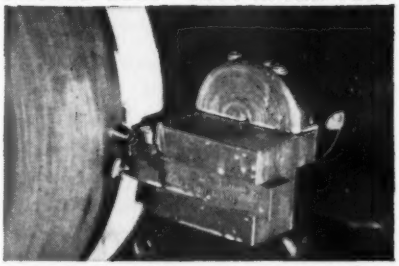
Kendex "turnover" inserts, with replaceable Kennametal shims and new chip control system, double the number of cutting edges, eliminate all regrinding and index in seconds. These features help provide consistent tool performance and hold downtime to a minimum.

Grade K21 is the General Purpose steel-cutting carbide now outperforming all other medium grades in the carbide industry. Superior performance of K21 is due to exceptionally high edge strength, strong resistance to cratering and superior wear qualities. An extremely versatile grade, K21 can be applied to general steel-cutting, heavy roughing and finishing.

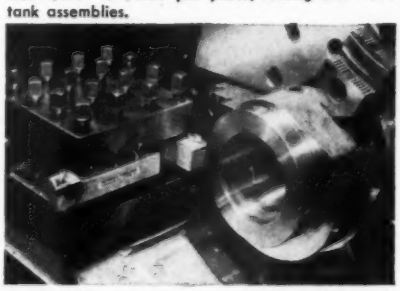
Kendex, in 17 styles and sizes; and K21, in popular blanks and inserts, are immediately available from stock. For their right application on your machining jobs, call a Kennametal Tool Engineer. He works exclusively with Kennametal . . . applying and servicing it. And be sure to ask for reports of Kendex and K21 repeat performances, job after job. KENNAMETAL INC., Latrobe, Pa.

*Registered Trademark †Patent applied for 8403

PROVED BEST—TEST AFTER TEST



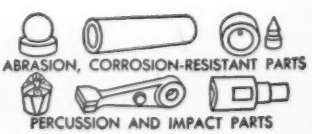
Kendex Tooling with "turnover" inserts cuts tool cost from $1.20 to $0.09 per piece, turning SAE 4140 tank assemblies.



Grade K21—on interrupted cutting, roughed and finished 6 times as many pieces as other premium carbide.

Give your machines the tools they deserve . . . the BEST

INDUSTRY AND **KENNAMETAL** *. . . Partners in Progress*

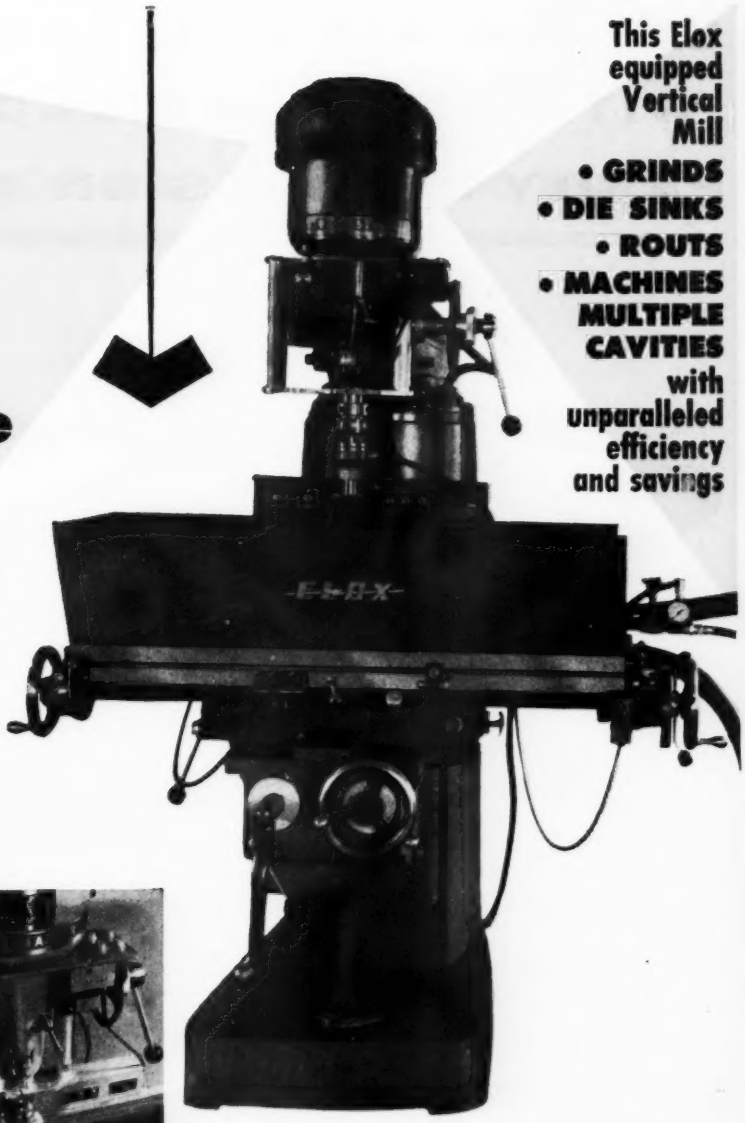


CIRCLE INFORM-A-GRAM KEY NO. 8

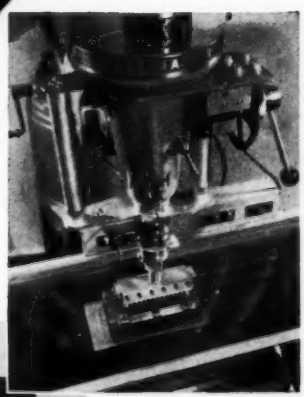
Electrical Discharge Machining produced this multiple cavity In 8 hours

This Elox equipped Vertical Mill

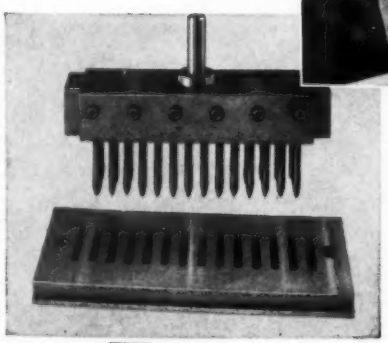
- GRINDS
- DIE SINKS
- ROUTS
- MACHINES MULTIPLE CAVITIES with unparalleled efficiency and savings



conventional machining time 40 hours



Multiple Cavity in coolant retainer tank of Vertical Mill. Machined automatically without operator attention or broach cost.



Finished die and brass electrode. Die Material: Hi Chrome Die Steel. Tolerances: +.0005"—.000 Finish: 15-20 micro inch.

Our engineering staff is always ready to help solve your specific machining problems. Representatives in your area will arrange appointments, at your request, for grinding, die sinking and cavity forming operations at EDM Demonstration Centers.

elox corporation of michigan

734 N. Rochester Rd. • Clawson, Mich.

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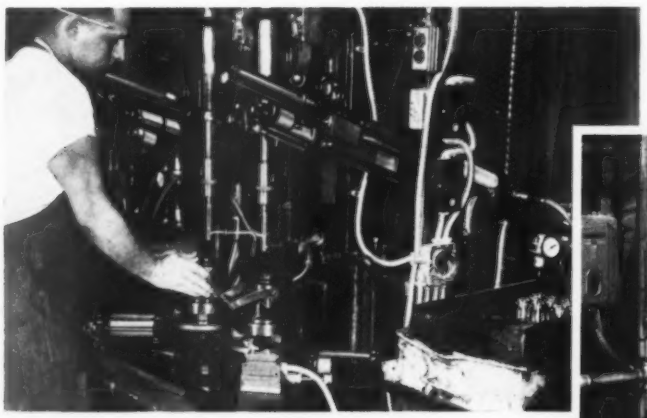
UNIQUE AIR CYLINDER WITH BUILT-IN ELECTRIC VALVE EASILY INSTALLS ON ANY MACHINE

Known as

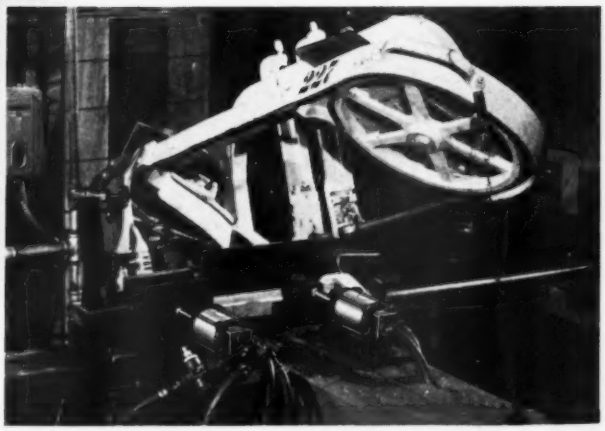
The Bellows Air Motor

it features

- **Built-in Directional Valve**
- **Built-in Speed Controls**
- **Only a Single Air Connection**



Drill Press Feed powered with Bellows Air Motor makes any standard drill press a fast semi-automatic machine.



Standard cut-off saws quickly converted to automatic operation with two Bellows Air Motors.

OFTEN CUTS COSTS 50% OR MORE

Changing a hand fed machine into a fast semi-automatic or automatic unit right in your own tool room is a cinch with the Bellows Air Motor—the unique air cylinder with all controls built-in.

The Bellows Air Motor is a complete work unit in itself. Directional valve, high or low voltage electric valve operating control, and precision speed controls are all built-in. You require only a single air connection—and that can be made with flexible hose.

Two, three—(or as many as you wish) Bellows Air Motors can be electrically interlocked to work in timed sequence to perform related operations with whatever precision you require.

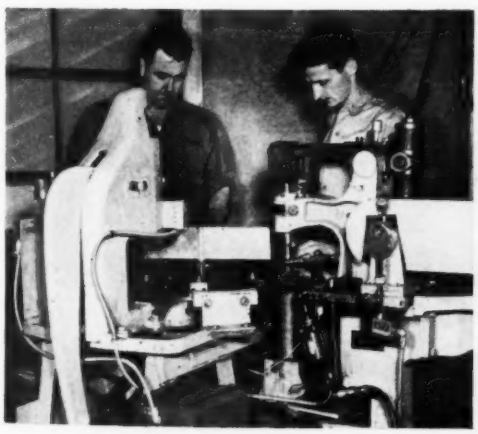
Bellows Air Motors are ruggedly built, precision-machined, to give years of trouble-free service. Records of twenty—thirty, even fifty million cycles are quite common. And Bellows nation-wide service (more than 100 field engineers in industrial areas of the United States and Canada) assures you of quick competent help in the application of Bellows Air Motors to your specific problems.

Write TODAY for this NEW four-color booklet

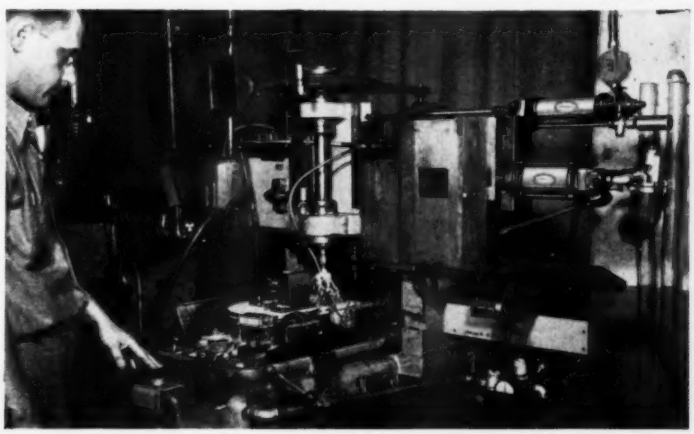
The story of Bellows Controlled-Air-Power and how industry everywhere uses it to find lower-cost ways of doing jobs better. Address Dept. TP1155, The Bellows Co., Akron 9, Ohio. In Canada: Bellows Pneumatic Devices of Canada, Ltd., Toronto.

The Bellows Co.
AKRON 9, OHIO

1282A



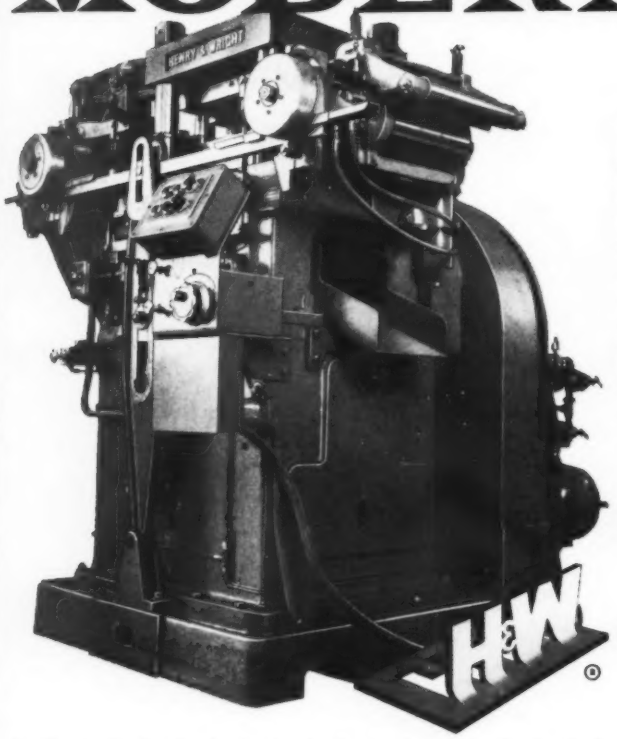
Kick press powered with Bellows Air Motor equals output of 5 foot-powered presses.



Three Bellows Air Motors turned this obsolete milling machine into a high producing unit.

CIRCLE INFORM-A-GRAM KEY NO. 11

MODERNIZING?

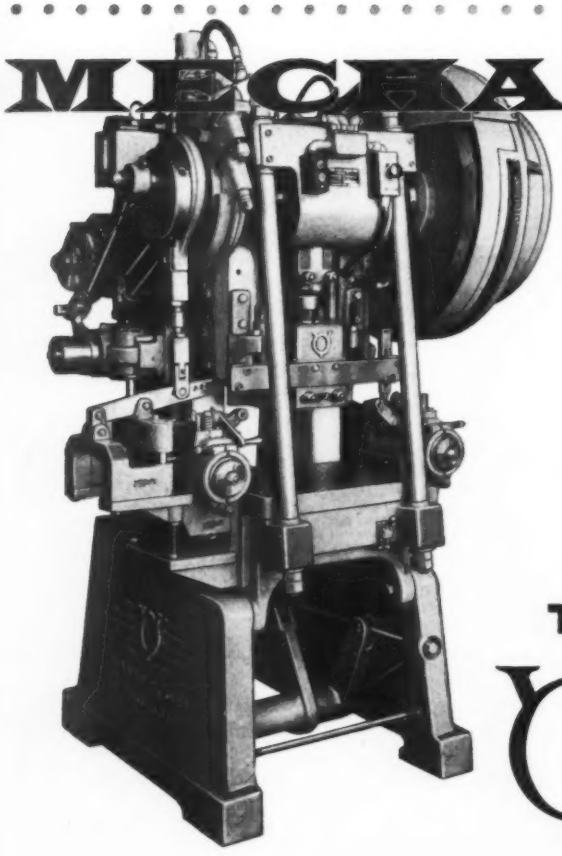


With a Henry & Wright you can shift from a straight blanking job to a complex progressive die and know that you will get maximum efficiency on both. Versatility? Sure. But there's more. You can push those jobs through at speeds to meet the toughest production schedules. And you can effect die changes quickly enough to make even short runs less costly.

Precision punch and die alignment is assured by the Henry & Wright's exclusive design features — its long ways, the fact that it uses a pulling instead of pushing stroke, the solid rigidity of its frame and four post guidance. For versatility . . . for work quality that goes up and stays up . . . for costs that keep going down . . . modernize with Henry & Wrights.

HENRY & WRIGHT
Division of Emhart Mfg. Co.
511 WINDSOR STREET
HARTFORD 1, CONNECTICUT

MECHANIZING?



You can't get the complete story on what equipped presses can do to effect new economies until you've discussed it with V & O. We've specialized in "packaged" production units for over 60 years.

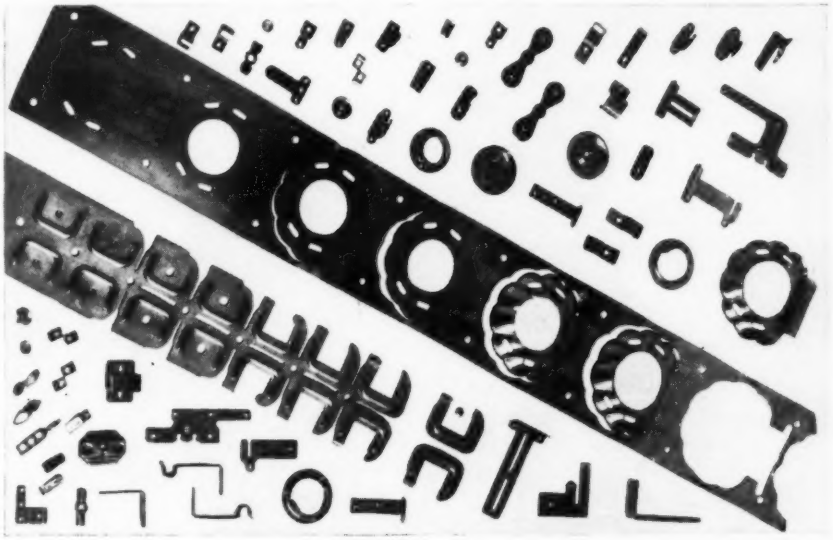
On top of that, V & O presses are engineered for mechanization. Built to the highest machine tool standards, V & O's feature the precision of long slides, hand-scraped ways and bearings — refinements pioneered by V & O to provide the accuracies essential to efficient operation of tools and attachments. If you want an equipped press, engineered and tooled by acknowledged experts, see V & O. If you want a press that is easiest for your own tool engineers to mechanize, make sure it's a V & O.

THE V & O PRESS CO.
Division of Emhart Mfg. Co.
421 UNION TURNPIKE
HUDSON, NEW YORK

LOOK WHAT YOU CAN DO WITH A

HENRY & WRIGHT

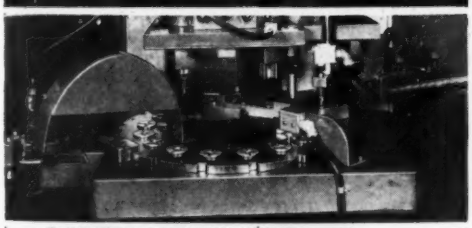
Each of the parts shown below was produced complete-per-stroke from coil stock. Work quality through the steps in the progressive die is thus subject to only two variables—the precision of the die and the care with which it is set. You can control these. The precision of a Henry & Wright does the rest.



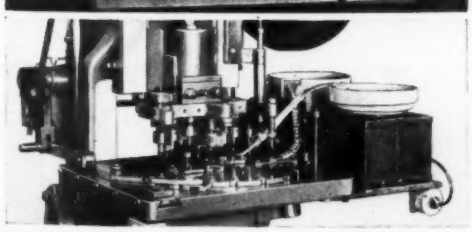
LOOK WHAT YOU CAN DO WITH A

V & O PRESS

Model 50S V & O, using an 18 station dial feed and a five-station progressive die, makes outer housings for ball bearings.



Set up here produces finished piece, using slide and dial feeds with blanking, forming and piercing dies.



This equipped V & O press has two hopper feeds synchronized with a dial feed and multi-station progressive die.

EMHART MFG. CO.

Only the best is good enough

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MACKLIN has long had the reputation for producing the highest quality grinding wheels for all types of production and specialized grinding requirements. Macklin's contributions to the general improvement of grinding wheels in their twenty-eight year history have been many.

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CIRCLE INFORM-A-GRAM KEY NO. 14

MOORE SPECIAL TOOL COMPANY

Holes, Contours, Surfaces

Published in the interests of greater accuracy and quality in the toolroom and on the production line by the Moore Special Tool Co., Inc., 726 Union Ave., Bridgeport 7, Conn., builders of Jig Borers, Jig Grinders, Panto-Crush Wheel Dressers, Precision Rotary Tables, Motorized Centers and a complete line of Hole Location Accessories.

New 424-page Book Tells How You Can Produce Tools, Dies, Precision Parts the Modern Way...

"Holes, Contours and Surfaces" Just Published

EXCLUSIVE...184 pages of Woodworth Hole Location Tables

"HC&S" includes a 184-page section of Woodworth Circular Tables which greatly simplify calculating rectangular coordinates for locating hole centers on a circular layout. There is a table for each pattern of holes, 3 to 100 inclusive. Unavailable elsewhere, these tables alone are worth more than the price of the book.

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While "PHL" dealt only with jig boring and jig grinding of holes, this new, 424-page volume describes subsequent hole-location developments, covers contours and surfaces, and introduces the subject of linear form grinding. "HC&S" is a must for every toolmaker, jig borer operator, jig grinder operator, machinist, tool engineer, production engineer, machine buyer, machine builder, production executive, product designer, apprentice and student.

495 Photos and Drawings

"HC&S" features a multitude of close-up instructional photographs, working drawings and charts placed adjacent to text so that it can be followed photographically.

"HC&S Fills Urgent Need" ....Burnham Finney

Here's what Burnham Finney, distinguished editor of *American Machinist,* says about "HC&S": "Outstanding for its clarity of expression, its technical accuracy...fills an urgent need and should live long on the bookshelves and work benches of the American Metalworking Industry."

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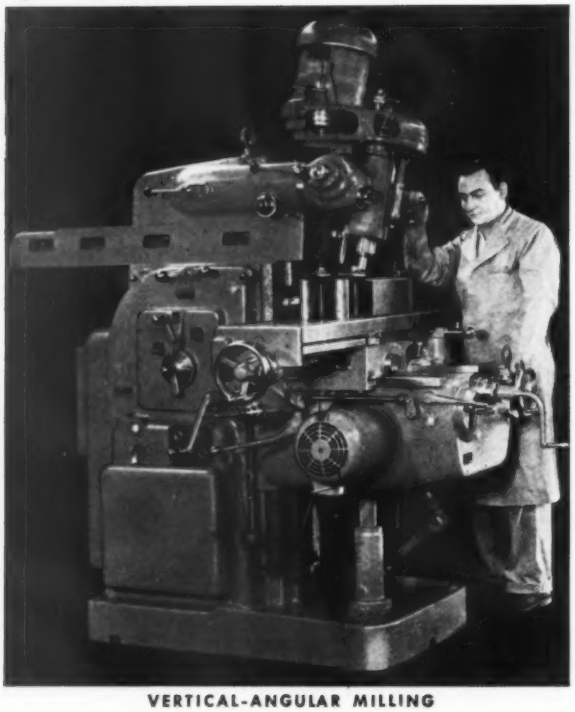

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COMBINES RUGGED DESIGN, TOP PERFORMANCE WITH TOOL ROOM ACCURACY

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As a horizontal it does conventional and climb milling up to 2,000 R.P.M. As a vertical-universal, it does precision work up to 5,600 R.P.M.

COMPARE THESE FEATURES

Exclusive Gorton Receptor Ram increases work area, vertical capacity and transverse cutting capacity.

Available with 56″ table (28″ travel), 62″ table (34″ travel) or 76″ table (48″ travel).	Rigid support for work with 24½″ bearing spread on knee and large square lock bearing guides.
Horizontal spindle horsepower: 7½, 10 or 10 over 5. Super-speed belt-driven vertical spindle: 1½ over ¾ H. P.	Aircraft type lubrication system dissipates spindle heat, minimizing growth at nose.
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Exclusive removable coolant pan speeds sump cleanout and coolant interchange.	Mechanical and dual electrical overload protection for cutters and work.

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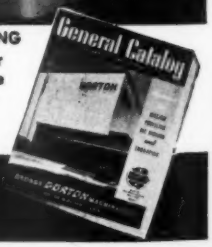

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CIRCLE INFORM-A-GRAM KEY NO. 17

New High-Torque Unbrako self-locking socket set screws

set them, forget them—they stay tight

Up to 40% higher tightening torque—a new Unbrako feature

RECOMMENDED SOCKET SET SCREW TIGHTENING TORQUES (Inch-Pounds)

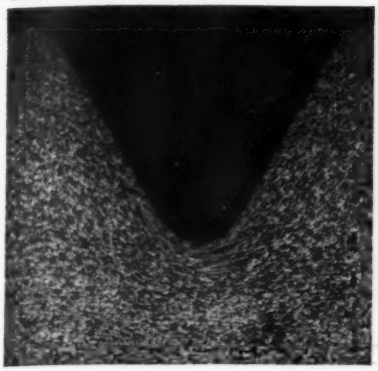
SCREW SIZE	UNBRAKO	SET SCREW B	SET SCREW C	MINIMUM DIFFERENTIAL %
#4	5	3.9	3.5	28
#5	9	7.8	7.4	15
#6	9	7.8	7.4	15
#8	20	14.7	14.5	36
#10	33	26.5	25	25
1/4	87	62	60	40
5/16	165	122	125	32
3/8	290	198	225	29
7/16	430	309	350	23
1/2	620	460	500	24
5/8	1225	1106	1060	11
3/4	2125	1540	1800	18
7/8	5000	3660	4600	9
1	7000	5025	6500	8

All UNBRAKOS can withstand higher tightening torques than ordinary set screws. For example, the recommended torque for a ¼" UNBRAKO is 87 inch-pounds —40% greater than that recommended for an ordinary set screw.

Research has proved that the tighter you seat a set screw the better it works. We went to work to design a socket set screw that could be tightened tighter than ever before without damaging the screw.

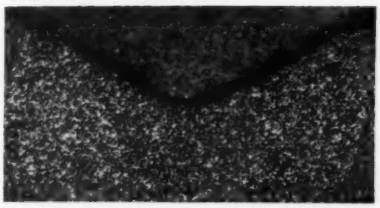
We formed a deeper socket. We put a radius in the socket corners. We developed fully formed threads. We established new methods of heat treatment in atmosphere-controlled furnaces. It took almost 6 years' research and development, but the new High-Torque UNBRAKO incorporates all of these improvements. And it retains the self-locking knurled cup point that keeps an UNBRAKO tight up to 48 times as long as a plain cup point set screw, regardless of the size of the point or the cup.

UNBRAKO SET SCREW



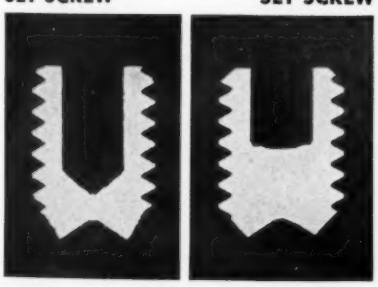
We fully form the threads—make the whole screw stronger. The metal is compressed into the closely knit grain structure that you see in this illustration. The grain flow follows the contour of the threads. There are no straight lines along which shear can occur. The UNBRAKO retains its flow lines even when ground down to .010" below root diameter. Screws with cut or ground threads lose thread form at root diameter.

UNBRAKO SET SCREW



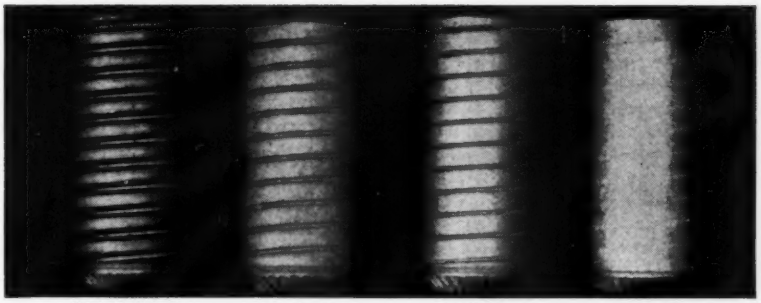
We put a radius in the socket corners—eliminate the sharp corners where cracks start. This distributes the stresses developed when tightening torques are applied. Ordinary socket screws have sharp corners which often crack when tightened even at lower recommended torques.

UNBRAKO SET SCREW **ORDINARY SET SCREW**

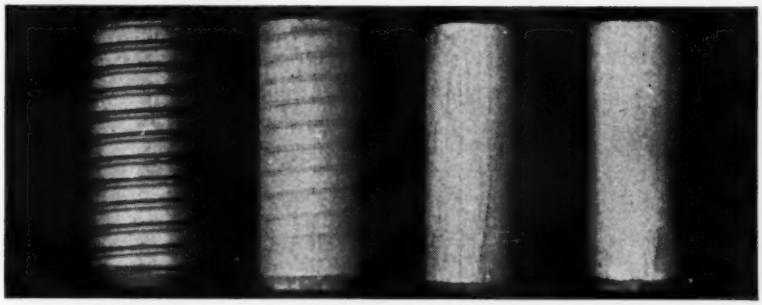


We form a deeper socket—give you more purchase with the wrench. Since more wrench can be put into the UNBRAKO socket, you can set the screw much tighter. And you won't ream the socket or round the corners of the wrench.

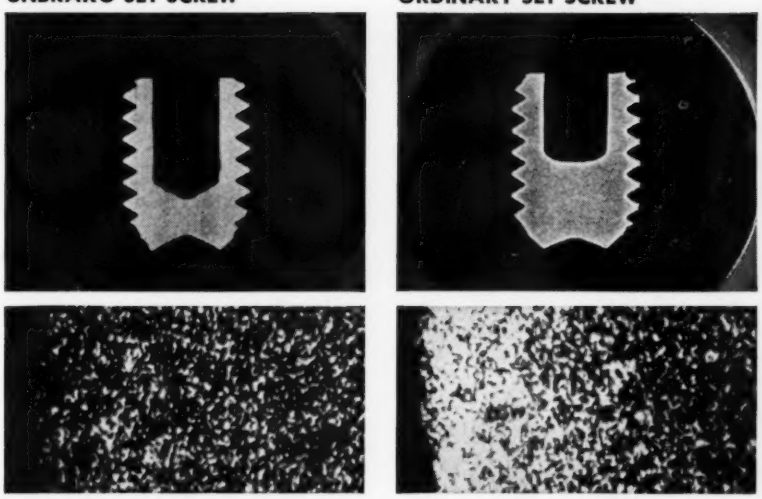
UNBRAKO SET SCREW



ORDINARY SET SCREW



UNBRAKO SET SCREW **ORDINARY SET SCREW**



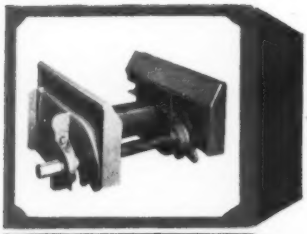
We heat treat an UNBRAKO properly. It's a ticklish job to heat treat a socket set screw. If you don't do it just right, you get decarburization. And decarb plays havoc with a screw. Put a wrench in the socket and you ream it. Run the screw into a tapped hole and you strip its threads. Try to seat the screw and its point shears off. These photos show the good and the bad. The UNBRAKO is clean. Its grain structure is uniform. There is no decarburization—the ordinary screw is suffering from an overdose of it, socket walls, threads and point are full of the telltale white spots.

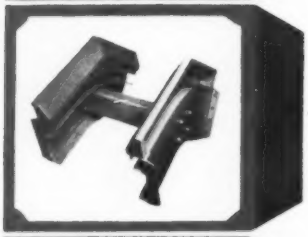
You can't buy a better set screw than UNBRAKO. See your authorized industrial distributor today. Or write STANDARD PRESSED STEEL CO., Jenkintown 36, Pa.

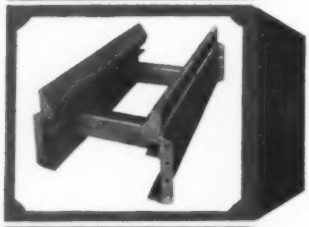
STANDARD PRESSED STEEL CO.

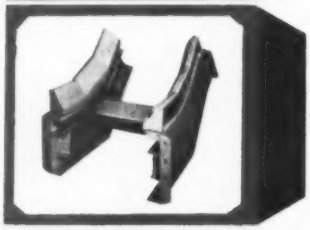
UNBRAKO® SOCKET SCREW DIVISION sps JENKINTOWN, PENNSYLVANIA

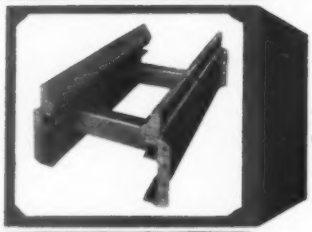
CIRCLE INFORM-A-GRAM KEY NO. 19

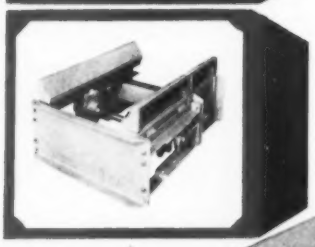












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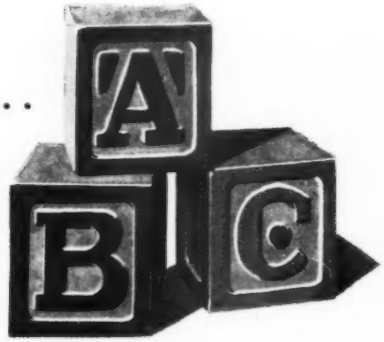

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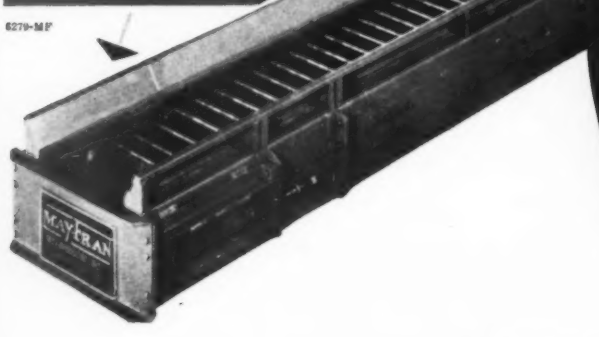

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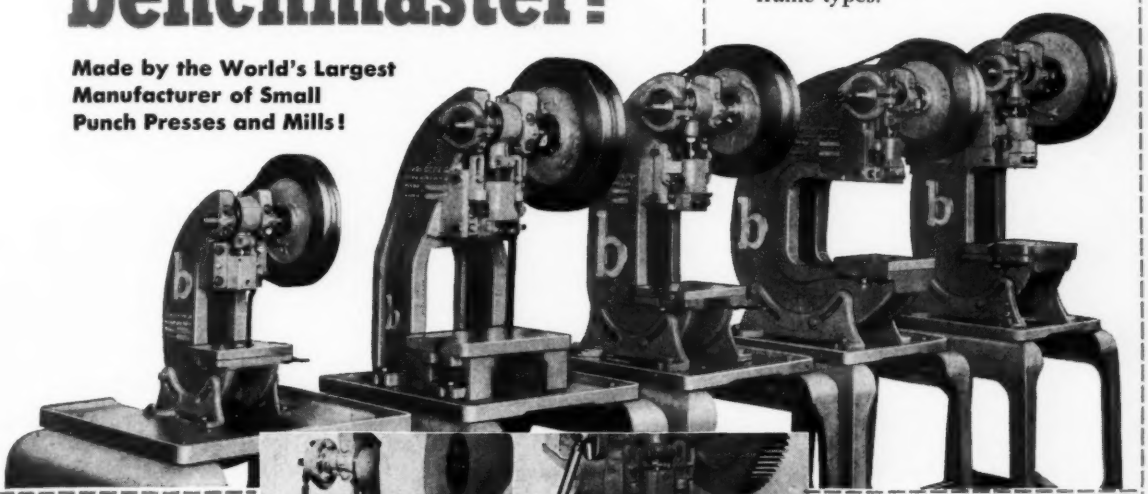

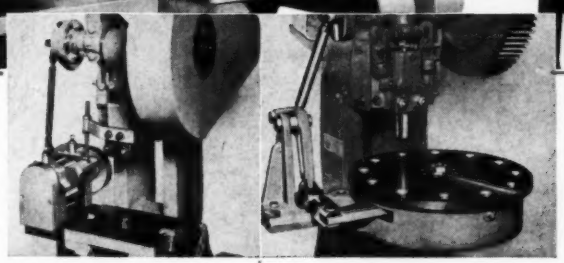

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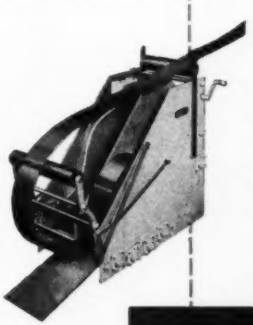
Lowest price on the market! Ideal for production work feeding small coil or strip stock. 3", 5", 7" and 9" roller widths. Two models, feeds adjustable from 0 to 3" cutoff or 0 to 6" cutoff. Plain, knurled or rubber covered rollers. Fits Benchmasters and other presses.

benchmaster ROTARY INDEX FEEDS

Converts your presses for automatically *marking, crimping, assembling, reaming, trimming, etc.*, at speeds up to 6000 strokes per hour. Easy installation—4 bolt mounting. Two sizes: 12" or 15" tables, 10 or 12 stations. Larger sizes on special order.

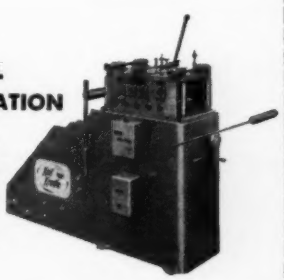
benchmaster KOIL KRADLES

Supplies a slack loop from which any machine can draw. Takes the drag off automatic feeding devices, increases feeding accuracy on progressive or multiple die operations; puts through more footage per hour. Many sizes: 1200 to 4000 lbs., 36" to 60" coil diameters, 10" to 28" widths. Larger capacities available.



benchmaster KOIL KRADLE AND ROLL STRAIGHTENER COMBINATION

Straighteners also available as single units. Feed rate variable 25 to 100 rpm, straightener thickness capacity .200". Other sizes available.



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CIRCLE INFORM-A-GRAM KEY NO. 21

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STUB
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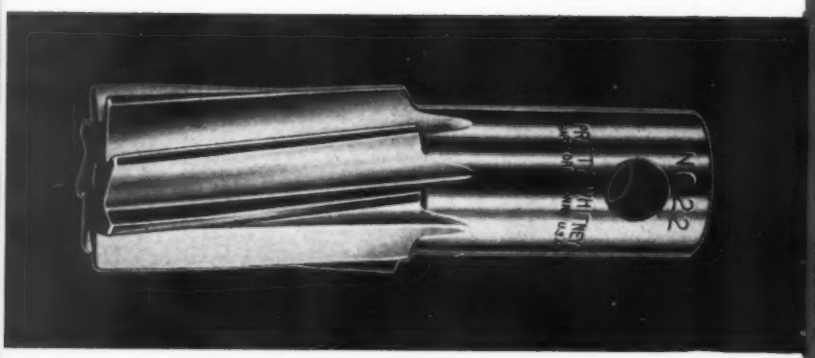

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Talk of the Month

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THE NEW ERA IN MACHINE TOOL TECHNOLOGY

by William C. Newberg
Vice President
CHRYSLER CORPORATION
and
President
DODGE DIVISION

I AM DEEPLY HONORED to be here with you today and to participate in launching this highly significant Machine Tool Show of 1955. It is easily possible that the present show is signalling the start of a new and miraculous era in machine technology that will equal in practical significance for the human race the magnificent industrial achievements of the past. Who knows?

All of us who saw the Machine Tool Show out at the former Dodge Chicago Plant in 1947 know just how spectacular have been the achievements in machine technology over the past eight years. We could not have known that most of the machines we saw then would be obsoleted before the next Machine Tool Show could be staged. But that is literally what has happened. It shows how fast things are happening in your field of work — how fast the tools which help to build the future become part of the outmoded past.

Machine tools are not the only things that have changed in the eight years since you staged that last Machine Tool Show. In the years since 1947 our country has been through a lot, and as a result there have been some pretty fundamental and highly important changes in the way people think. People have new ideas about the national defense, about international relations, and about the economic and social possibilities of life in America. They have a renewed faith in the strength of our democratic institutions and a new and deeper confi-

This address was delivered by Mr. Newberg before the 31st Annual Meeting of the American Machine Tool Distributors' Association.

dence in the resiliency and unlimited potential of our free enterprise economy.

This economy of ours has been through some pretty rough going—and it has proved itself seaworthy. It gave our country the basic strength to fight communism, to help other countries resist communism, and to build a strong defense to discourage further aggression. During the years when many people seriously believe we were only riding the upward phase of a disastrous cycle of boom and bust, the free economy provided the increased goods and services to match the tremendous civilian demands and the military demands that were occurring simultaneously.

Today we are enjoying a period of remarkable prosperity. National production, national income, and personal income are running at record rates. Employment is at an all-time high. For nearly four years the value of the dollar has remained virtually stable, fluctuating within a range of only five cents or so.

Things have been going well in the past few months — both at home and abroad — so well that a lot of us are probably wondering just how long our present good fortune will last. It doesn't seem normal in this troubled Twentieth Century to live in an era of good feeling — yet once in a while these days a man can almost persuade himself that the human race has come to its senses and has decided to work together to see just how much can be done by putting to work the resources, the machinery, and the brains at its disposal.

Whatever the future holds for humanity, we here in the United States can be sure of one thing — the kind of future we have will depend upon just how successful we are in encouraging the constructive cooperation of all those groups that form the basis of our strength and our prosperity.

One of the most interesting aspects of our free enterprise system is the series of creative partnerships that we have developed. Consider, for instance, the partnership between the big manufacturer and the independent retailer, between the producer of basic materials like steel and the independent fabricators of those materials, between the large manufacturer and the independent supplier from whom he buys machines, materials and services, and between industrial management and industrial labor.

Consider too the partnership of which all of you here today are members — the partnership between the designer and builder of machine tools on the one hand, and, on the other, the machine tool distributors who sell those tools to the manufacturer. We in industry know how productive this partnership is. We

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3 ASSURED ACCURACY . . . which eliminates rejects. Each cutter is made accurately to the required specifications and carefully inspected; in addition, a test piece is cut and the thread form inspected with a high-magnification optical comparator.

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For prompt effective service, give one of our factory-direct Sales Engineers the opportunity to analyze your thread milling and other cutting tool needs. Just write or phone the P&W Branch Office nearest you . . . see list below.

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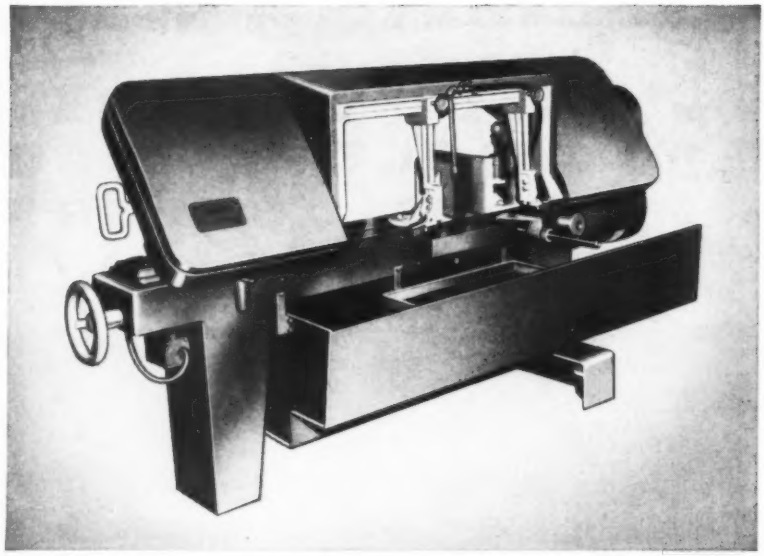

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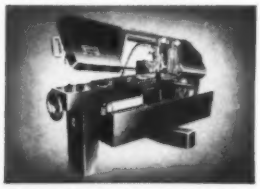
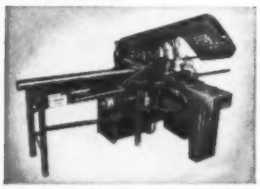
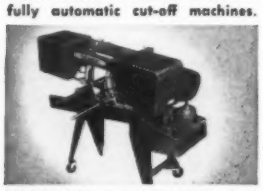


MODEL 8C cuts 8" round, 16" flat, 8" pipe. Coolant equipment and casters available.



KALAMATIC BAR FEED ATTACHMENT converts *Kalamazoo* saws to fully automatic cut-off machines.



MODEL 610 cuts 6" round, 10" flat. Coolant equipment and casters available.

CUTS 12-INCH ROUND, 20-INCH FLAT, 12-INCH PIPE

Accurate to a few thousandths, with minimum burr and kerf.

Four cutting speeds and variable frame weight adjustments provide a selection for various jobs — better sawing results, longer blade life.

Available with coolant equipment for uninterrupted production sawing — without coolant for intermittent cutting and for non-ferrous metals.

Designed throughout for maximum safety. All moving parts fully enclosed — only cutting section of saw blade is exposed.

Heavy duty 1 HP motor provides ample power for all cuts.

ASK YOUR *KALAMAZOO* DEALER FOR DETAILS AND DEMONSTRATION of the rugged Model 1220.

MACHINE TOOL DIVISION

Kalamazoo TANK and SILO COMPANY

1115 HARRISON STREET . . . KALAMAZOO, MICHIGAN

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know how important it is to our own success. We know that the machine tool distributor is the eyes and ears of the machine tool builder. He knows the needs of the manufacturer — and he knows the skills and the capacity of the builder. He is the vital link between the manufacturer who produces consumer goods in volume and the machine tool builder who makes that volume production possible. I wish more people in America could appreciate how much engineering know-how, technical imagination, and just plain patience go into the job of designing and building the right machine tools to do the jobs of industry.

We live in a time of swift and accelerating change. And in such a time there is no group in our competitive business economy that can afford to rest easy and satisfied with its present ways of operating or its present ways of thinking. But for all of you who compete in designing and building productive machinery, the tempo of change has a special and overwhelming importance. You work in a professional environment in which the primary and immediate condition of life is obsolescence. It is your business to design and build products this year that will be so good that we manufacturers can't afford to go on using the equipment you sold us last year. The extent to which you achieve this goal is the measure of your success as machine tool designers, builders, and sellers. The public at large is beginning to be aware of your accomplishment—of the accelerating speed with which you are forcing the replacement of our excellent old machines with new and even better ones.

Tremendous Improvements

But I wonder if people generally know just how fast this process is moving. How many people, for instance, know about the tremendous improvements that have been made in virtually all kinds of metal-cutting machine tools over the past 10 years? You and I know that some present-day lathes are turning 15 times faster than those in use before World War II. We know that the development of high-speed cutting metals such as tungsten carbide has vastly increased the depth of the cut as well as the speed at which these lathes operate — and as a result they are using nearly twice the power they did at the time of the last Machine Tool Show in 1947.

Similar advances have been made in pressing and stamping. Only six years ago most big presses were capable of turning out large stampings at the rate of approximately six strokes a minute. Today there are big presses with new automatic materials-handling devices which can operate all day long at 18 strokes a

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Manufacturers' Representative: A few desirable territories are being opened to qualified representatives. Please write for detailed information.

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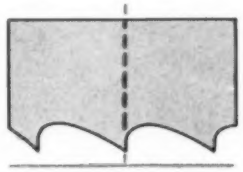
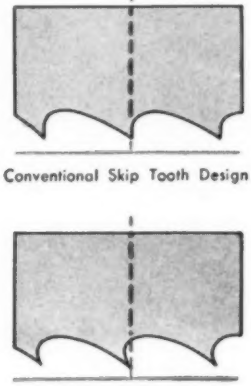
Announcing!

NEW DETROIT BARNES U.S.A.

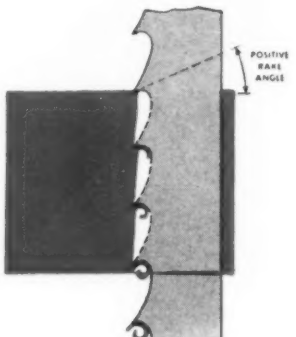
HOOK TOOTH BAND SAW BLADES



Conventional Skip Tooth Design



New "Hook Tooth" design showing positive rake angle.



New "Hook Tooth" design permits more bite with lower feed pressure—greater chip removal without increasing frictional heat.

A LITTLE CHANGE MAKES A *BIG* DIFFERENCE!

A little change *does* make a big difference. Barnes "Skip Tooth" band saw blades have given the best of service for years. Their quality performance in the metal cutting field has been outstanding. A slight change in the rake angle of the teeth, however, has resulted in even greater cutting efficiency.

In the new Barnes "Hook Tooth" blades, all Barnes' quality features have been retained—only the "hook" has been added to improve cutting. The new positive rake angle inclines the teeth toward the work resulting in more bite at lower feed pressure. "Hook Tooth" blades cut faster and easier. They last longer. This means real savings for you!

"Hook Tooth" blades are available through Barnes distributors in all standard sizes, 2 to 6 teeth per inch, ¼ in. to 1 in. widths and are packaged in the same familiar Barnes boxes of 100 ft. and 250 to 500 ft. economical random coils. They are also available cut to length and welded by Barnes top quality welding process.

Call your Barnes' distributor the next time you need band saw blades. Specify Barnes "Hook Tooth" for wood, plastics, paper and non-ferrous metal cutting as well as ferrous castings and mild steels with thick cross sections.

when cutting counts BARNES *count on Barnes*

W. O. BARNES CO., INC.
1297 TERMINAL AVE. • DETROIT 14, MICH.

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minute or better. This is a spectacular gain of at least three to one since 1949.

Despite the gains that have been made in all phases of press work in recent years, it seems likely that press speeds will reach new highs in the immediate future. A few stamping machines equipped with progressive dies already operate at speeds of about 600 pieces a minute, and for some applications the output may exceed a 1000 pieces a minute within the next ten years.

Besides operating at higher speeds and performing in ways that were unheard of only a few years ago, machine tools are now working metal to far closer tolerances than were formerly possible. We in the automobile industry have been particularly impressed by the machine tools you have created to turn out the many millions of tiny and precisely fashioned gears we need to produce automatic transmissions.

Recently the public has been hearing more and more about a new kind of machine tool that cuts the hardest metals by means of a stream of electrons — and another that uses ultrasonic vibrations.

Automation Cannot be Ignored

The most widely publicized of the many recent developments in machine technology is what we have all begun to call automation. Now my remarks today are not intended as another speech on automation. But I can hardly ignore the subject altogether at a meeting of machine tool people. To do so would be like speaking at a dress buyers' institute without saying a word about Christian Dior.

There are three currently used definitions of automation. The first defines it as the automatic movement of parts between various stages of a production process. The second defines it as the use of machines to control machines. The third definition is somewhat more complicated. It defines automation as a new concept of the order and structure of economic activity which requires business management to plan more systematically than ever before the relationships between the designing, scheduling, producing and marketing of products.

Whether you prefer the simpler or the more complex definitions of automation, I think you will all agree that automation is only one manifestation of a much wider and more fundamental phenomenon of our time. That phenomenon is the accelerating speed of change in machine technology.

Perhaps the best way for me to start talking about automation is to tell you something about Chrysler Corporation's newest and most highly automatic plant, which is now turning out Plymouth V-8 engines

. . . *Continued on page 34*

Talking About Die Sets

WITH

PHIL MARSILIUS

Vice-President
The Producto Machine Co.

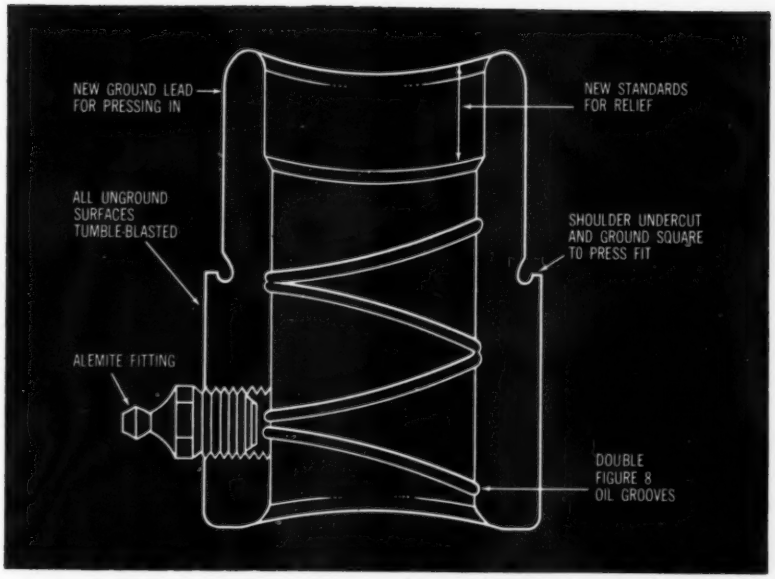
Lubricate for Longer Life—Faulty or insufficient lubrication of guide pins and bushings can result in a rapid reduction in the accuracy of die operation. Since the relationship between wear and friction is a direct ratio, proper lubrication greatly reduces wear and increases the useful life of pins and bushings. There are many fields of thought as to the type of lubricant best suited to die set operations at different speeds and varied accuracy requirements. The type used depends on the experience of the press-room foreman. The method of application also varies widely to suit individual needs.

Standard lubrication methods involve a simple oil groove in the bushing. Here are a few inexpensive systems using the guide pin bushing as a source of lubrication: 1. Relief in the top of bushing is loaded with oil or grease; 2. Oil caps that feed oil into either a circular or Figure 8 groove in bushing through a hole in bushing wall; 3. An oil or grease fitting through which lubricant is forced manually as the need arises; 4. An oil reservoir cup that fits snugly over pin and from which oil is dipped onto bushing with each stroke of the press and is drawn up to completely coat bearing surface of pin for next downward stroke; 5. A steel oil-retaining ring containing a felt washer that fits over pin and slides up and down by spring-loading action or is attached to bushing.

Guide pins also have been made with oil grooves around the circumference or with splines or slots along the length, fed from inside through small connecting holes. Here, of course, bearing surface is somewhat reduced and pins tend to pick up dirt or chips.

Another method minimizes the amount of lubrication required. Bushings are made of bronze or other "soft" materials which hold lubricant in their surface while at the same time reducing friction normally encountered with like metal contact.

Whatever method you choose, proper lubrication will add life to your die sets and help maintain die accuracy.


NEW GROUND LEAD FOR PRESSING IN
NEW STANDARDS FOR RELIEF
ALL UNGROUND SURFACES TUMBLE-BLASTED
SHOULDER UNDERCUT AND GROUND SQUARE TO PRESS FIT
ALEMITE FITTING
DOUBLE FIGURE 8 OIL GROOVES

Cutaway drawing of new Producto bushing

NEW PRODUCTO BUSHINGS IMPROVE DIE SET ACCURACY, APPEARANCE AT NO EXTRA COST

Producto has engineered five important new design features into its master bushings*—the heart of the die set—which provide greatly improved accuracy and appearance *at no additional cost to users:*

1. NEW STANDARDS FOR RELIEF give greater bearing surfaces, improve accuracy. 2. GROUND SHOULDERS seat bushings square to punch holder, guaranteeing perfect alignment. 3. NEW GROUND LEAD ON PRESS FIT starts bushing into punch holder easily. 4. DOUBLE FIGURE 8 OIL GROOVES fed by grease fitting provide a constant source of lubrication to pin and bushing. (Optional spring-loaded grease cups are available.) 5. TUMBLE-BLASTING OF ALL UNGROUND SURFACES polishes surfaces in areas normally not finished after hardening.

These innovations are typical of the steps being taken to keep Producto's die set quality abreast of its service.

If you would like to receive *Die Set Digest,* our new, fact-filled quarterly, just drop us a note. And remember, for precision die sets fast, call your nearest Producto branch.

*"Popular size" master die sets already have these new bushings. They will soon be available on all sizes.

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970 Housatonic Avenue, Bridgeport 1, Connecticut
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CUSTOMER SPECIFIED

An automotive manufacturer recently asked Kearney & Trecker to design and build a special machine which would increase production milling of three pads and three pockets on transmission rear brake drums.

Finish-machined pads and pockets on transmission brake drum.

KEARNEY & TRECKER DESIGNED

Here is our design. It's a Kearney & Trecker six-station rotary indexing milling machine which mills 162 transmission rear brake drums per hour. It does the work of two machines, each of which could mill only one workpiece at one time. With the new unit, six pieces are milled at once. A prominent feature of this machine was the application of standard Kearney & Trecker units . . . a 48" rotary index table and a 24" feed slide. This type of design appreciably decreases the overall cost of the machine. All six spindles are contained in one head which is bridged over the table. Retractable quills raise and lower the spindles.

New production efficiency starts with Kearney & Trecker Milwaukee machine tools

For more details on the machine illustrated ask for Data Sheet No. 1044. The free booklet "Doorway to a proven method for solution of big and small metalworking problems" is also yours for the asking.

This typical example proves you can reduce costs and start on the road to higher production with machines designed and built by Kearney & Trecker's Special Machinery Division. With more than 50 years' experience in machine design and manufacture, Kearney & Trecker has all the ingenuity and skill required to solve special machining and production problems.

Why don't you take advantage of our abilities? They can pay off in profits for you. Your Kearney & Trecker Special Machinery Division representative will be pleased to give you all details. Call him today!

Builders of Precision and Production Machine Tools Since 1898

CIRCLE INFORM-A-GRAM KEY NO. 29

CATALOGS ON
TOGGLE CLAMPS
FIXTURE CLAMPS
LEAF JIGS

Only WESPO can furnish All the following work-holding devices

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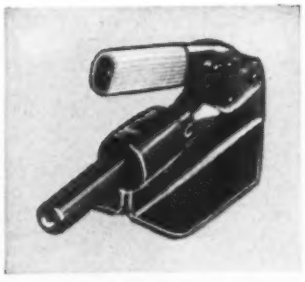

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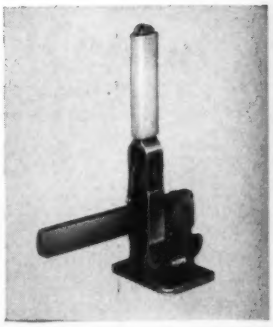

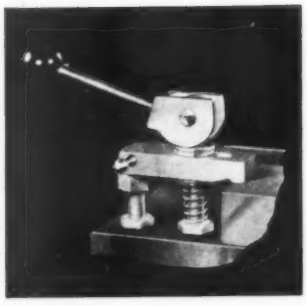

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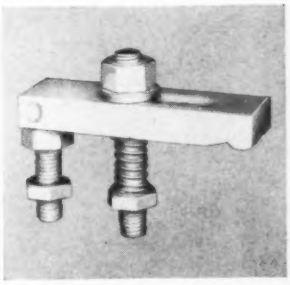
136 SIZES

There is a WESPO Clamp Assembly to suit every job.



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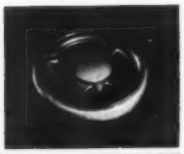

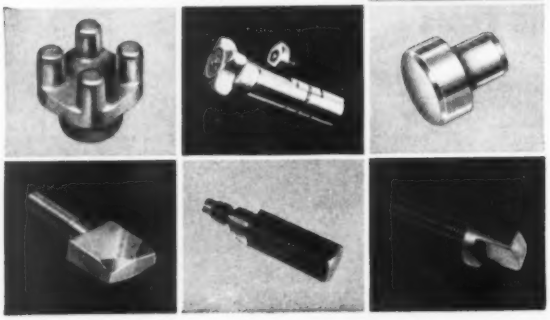

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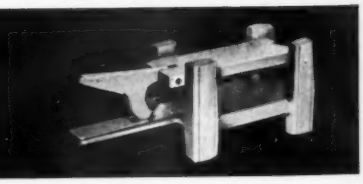

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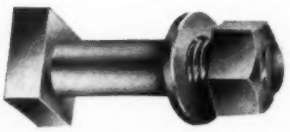

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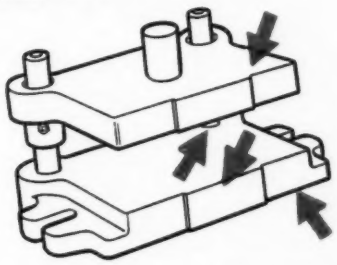
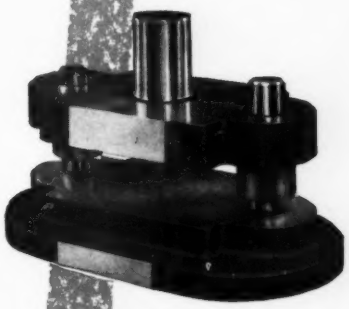
Made to J.I.C. Press Room Standards.

WEST POINT MFG. CO.

26935 W. 7 MILE ROAD • DETROIT 19, MICHIGAN

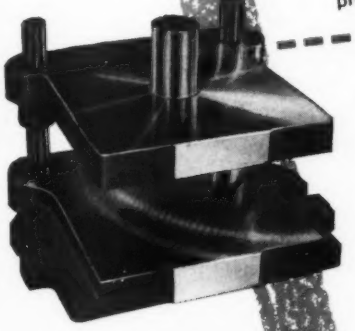
CIRCLE INFORM-A-GRAM KEY NO. 30

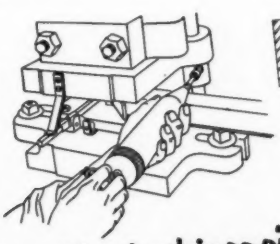




all horizontal surfaces ground

Now, in addition to the vital die surfaces of all steel or semi-steel sets, all horizontal surfaces, including tops of punch holders, are ground with the same precision that has made Danly quality the accepted standard. Surface grinding assures a flat, true working surface, saves tooling time and improves accuracy.





Shoulder bushings oil lubricated

All Danly Standard Sets equipped with shoulder bushings are designed for easy, pressurized oil lubrication. Fittings in bushing shoulder are easily reached from front or side. Cut-away sketch shows oil channels in bushing that form lubrication reservoir for long runs and maintain oil film with a minimum of clogging or gumming.

New features like these keep DANLY ahead

Throughout the years, the rigid precision standards of Danly have made Danly Die Sets the recognized standard for quality. Now Danly Die Sets offer you two new features to save hours in the die shop, make tooling-up much faster and assure longer die life. All new Danly Die Sets have an oil lubrication system for shoulder bushings and all horizontal surfaces are ground to assure a true working surface for die making. Danly's nationwide system of assembly branches is ready to serve you. Call Danly today.

DANLY MACHINE SPECIALTIES, INC.
2100 South Laramie Avenue, Chicago 50, Illinois

HERE ARE THE DANLY PLANTS THAT SERVE YOU

BUFFALO 7
1807 Elmwood Avenue

CHICAGO 50
2100 S. Laramie Avenue

CLEVELAND 14
1550 East 33rd Street

DAYTON 7
3196 Delphos Avenue

DETROIT 16
1549 Temple Avenue

GRAND RAPIDS
113 Michigan Street, N.W.

INDIANAPOLIS 4
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LONG ISLAND CITY 1
47-28 37th Street

LOS ANGELES 54
Ducommun Metals & Supply Co.
4890 South Alameda

MILWAUKEE 2
111 E. Wisconsin Avenue

PHILADELPHIA 40
511 W. Courtland Street

ROCHESTER 6
33 Rutter Street

ST. LOUIS 8
3740 Washington Blvd.

SYRACUSE 4
2005 West Genesee Street

DANLY

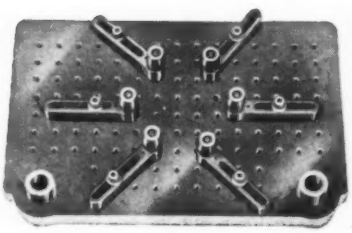
NOW! PUNCH & DIE BUTTON POSITIONING Flexibility with R-B Flex-Mount RETAINERS

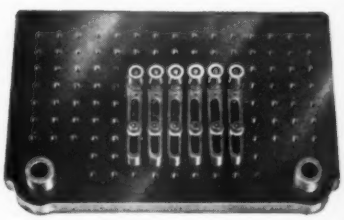
Cut your set-up time for short production runs on light gauge metals . . . R-B Flex-Mount Retainers permit quick, easy and flexible mounting of punches and die buttons. For, Flex-Mount Retainers are easily bolted in any desired position on T slotted or drilled and tapped commercial die sets.

Standardized R-B punches and die buttons (round, square, oblong or special shapes to customer specifications) are used in these retainers. Stripping is accomplished with R-B rubber strippers or R-B rubber covered springs to eliminate costly metal strippers, retainer screws and springs.

TYPICAL Flex-Mount POSITIONING Flexibility

Shown are but two of an almost unlimited number of mounting arrangements that can be made with Flex-Mount Retainers.





Use R-B Engineering Service for Your Tough Piercing Problems

RICHARD BROTHERS PUNCH DIVISION
ALLIED PRODUCTS CORPORATION
DEPT. 78 • 12635 BURT RD. • DETROIT 23, MICHIGAN

Please send me additional information.

NAME_____ TITLE_____

COMPANY_____

ADDRESS_____

CITY_____ ZONE_____ STATE_____

Also Produced in
OTHER ALLIED PLANTS
SPECIAL COLD FORGED PARTS
STANDARD CAP SCREWS
PRECISION GROUND PARTS
SHEET METAL DIES MADE OF FERROUS ALLOYS, ZINC ALLOYS OR PLASTICS

CIRCLE INFORM-A-GRAM KEY NO. 32

Now...Tapping

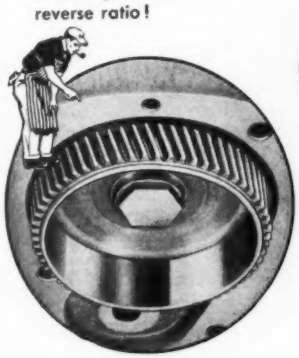
SPEED! SPEED! SPEED!

Here's the new high speed tapping attachment for SHORT RUNS—CONTINUOUS PRODUCTION—AUTOMATION!

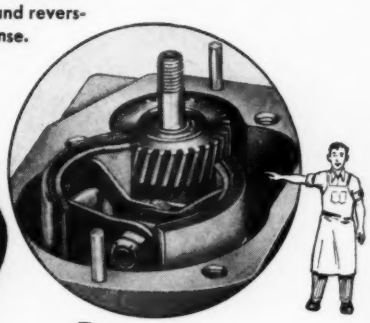
with the SUPER Jarvis TORQOMATIC

Permanently lubricated ball and needle bearings throughout!

Helical gears—1 to 1 reverse ratio!



Toggle-type clutch gives ultra-sensitive forward and reversing response.



For *high speed* production tapping—Jarvis TORQOMATIC pays for itself over and over again!

Single collet performs full range of tapping operations.

Here's the business end of the TORQOMATIC . . . gives phenomenal tapping SPEED!

WRITE NOW!
Send for bulletin and prices.

Jarvis
CORPORATION
POWER TOOLS FOR INDUSTRY
DEPARTMENT 6,
MIDDLETOWN, CONNECTICUT

CIRCLE INFORM-A-GRAM KEY NO. 33

...more than meets the eye!

There's only one way for you to find out just how good Chicago-Latrobe Drills really are. That way is to *try* them. Try them and watch your production go *up*. The finer steels, the engineering skills, the extra experience in the use of carbides . . . all the extras that go into these fine tools show up finally in what our customers call "extra cutting mileage." Ask your distributor for

CHICAGO-LATROBE
High Speed and Carbide-Tipped DRILLS

Extra service too!

Your Chicago-Latrobe Distributor specializes in "on-time" delivery. And—he is a drilling and reaming expert who offers free counselling service on your tough problems. Call him in soon.

DOUBLE CIRCLE TOOLS

Chicago-Latrobe
422 WEST ONTARIO STREET CHICAGO 10
• DRILLS • COUNTERSINKS • CARBIDE TOOLS
• REAMERS • COUNTERBORES • SPECIAL TOOLS
CIRCLE INFORM-A-GRAM KEY NO. 34

. . . Month's Talk, from page 26

for our 1956 line. The capacity of this engine plant is 150 an hour. Tools and other equipment were installed at a cost of approximately $50 million.

Here are a few of the features of the plant's production lines, which we believe are the most compact and at the same time the safest, the most flexible, and the most versatile of any in the industry.

Cylinder blocks move automatically on two 1600' lines. On each line there are 70 machines that perform 157 operations. The lines are interconnected so that the blocks can be transferred from one line to the other at nearly any stage in the operation. When an individual machine stops for a tool change or for repair, the line continues operating at normal pace by drawing on banks of blocks stored at stations between the lines.

At the head of the cylinder block lines are some of the largest mechanical broaches ever built. Each broach covers nearly a thousand square feet of floor space. It "planes" to size the ends, top and bottom of each block.

Automatic assembly machines are equipped electronically to avoid making mistakes. For example, the machine that assembles the connecting rods is equipped with "memory stations", which prevent it from trying to screw a nut on a bolt if the bolt is not in position. Each part of the machine remembers what the other parts have done or have not done, and automatically rejects all assemblies that are incomplete.

Benefits of Automation

Plants like this one are bringing into a new phase the evolution of machine technology toward the increased use of power. Machinery today supplies approximately 96% of the energy used in manufacturing as compared with about 26% a hundred years ago. And one of the most important meanings of automation is that it is placing in the hands of men new advanced forms of power-driven equipment that are making life in the factory safer, less fatiguing, less monotonous, more productive, more interesting and more demanding on the intelligence and skill of the worker.

With every year that passes we are going to need more men who understand complex mechanics and electronics — more men who can read intricate blueprints and hunt down trouble in our automated equipment—more millwrights, electricians and repairmen. And this trend means not only more interesting and more challenging lives for factory workers, but higher ratings and higher pay.

Automation also means that the products of our factories will be

. . . *Continued on page 42*

Let New Britain engineering supply a new approach

A machine is listed as an asset on your balance sheet, but if it slows your production and makes your costs too high, it's an asset you can't afford.

We invite you to call in your New Britain representative for a new approach to turning out the pieces that affect your profit margins. He has one of the broadest lines in the industry to choose from.

The following four pages contain examples of New Britain's New Approach.

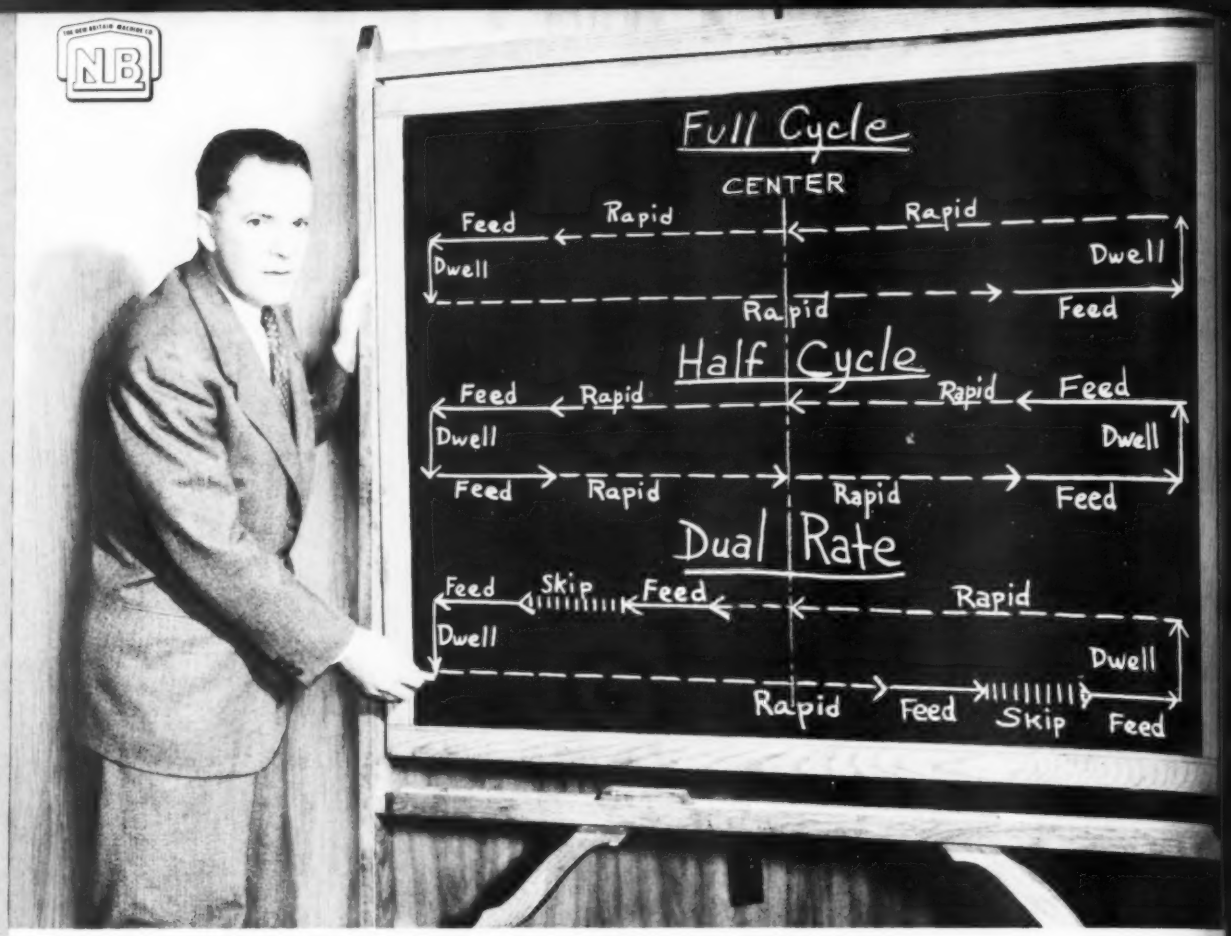
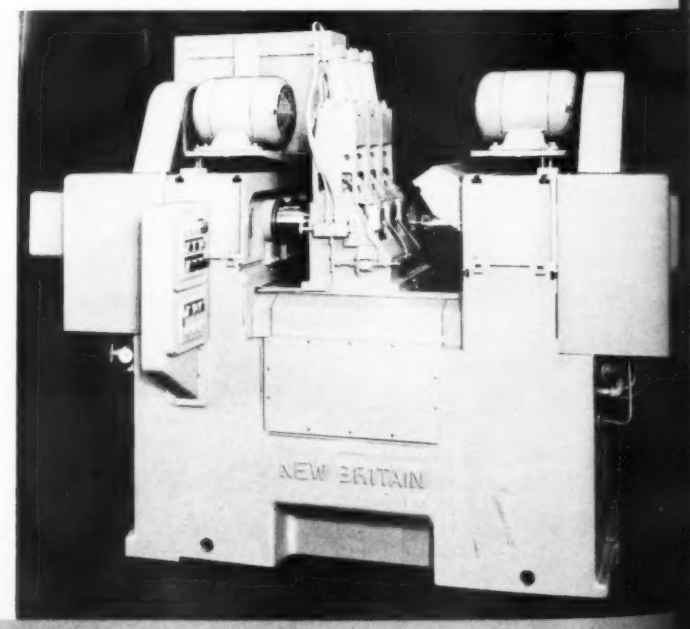


Diagram of versatility

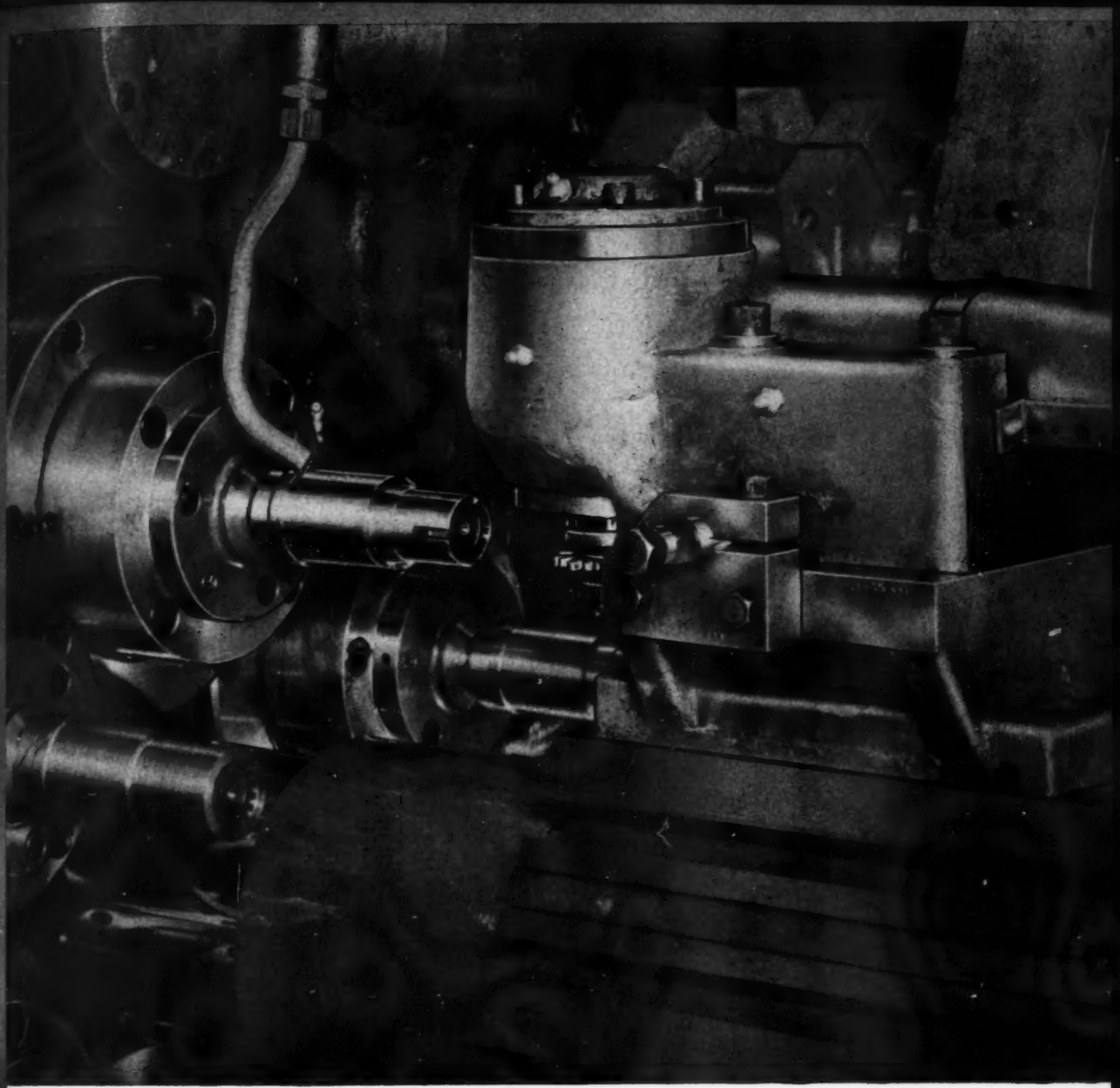
New Britain engineers can show you how to get two pieces per cycle (or double-end production) because of the flexibility of cycling they have designed into our double-end precision boring machines. The blackboard sketches show only three of many set-up possibilities.

FEATURES:

- **Completely separate hydraulic unit outside machine frame**
- **Automatic re-cycling or manual operation**
- **New Britain precision boring spindles**
- **Variable feed during cutting cycles**
- **Special fixtures and work holding devices**
- **One to four spindles at each end**
- **Tool or work rotating**
- **Coolants (optional)**



Model 50 New Britain Double-end Precision Boring Machine



The best machine is only as good as the engineer who tools it

How imaginative tooling can save time and money

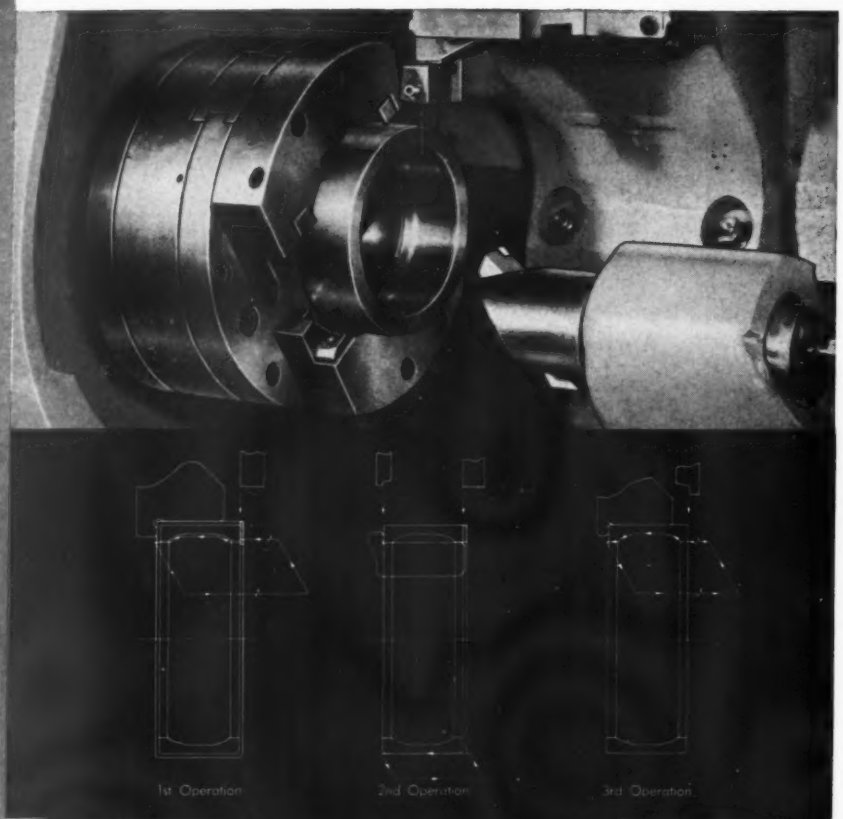
Skillful application of engineering principles to perform secondary operations on one machine can work wonders on *cost-per-piece:* Compare the cost of this milling attachment with the cost of a separate milling machine, *plus operator, plus overhead, plus maintenance, plus transfer time.*

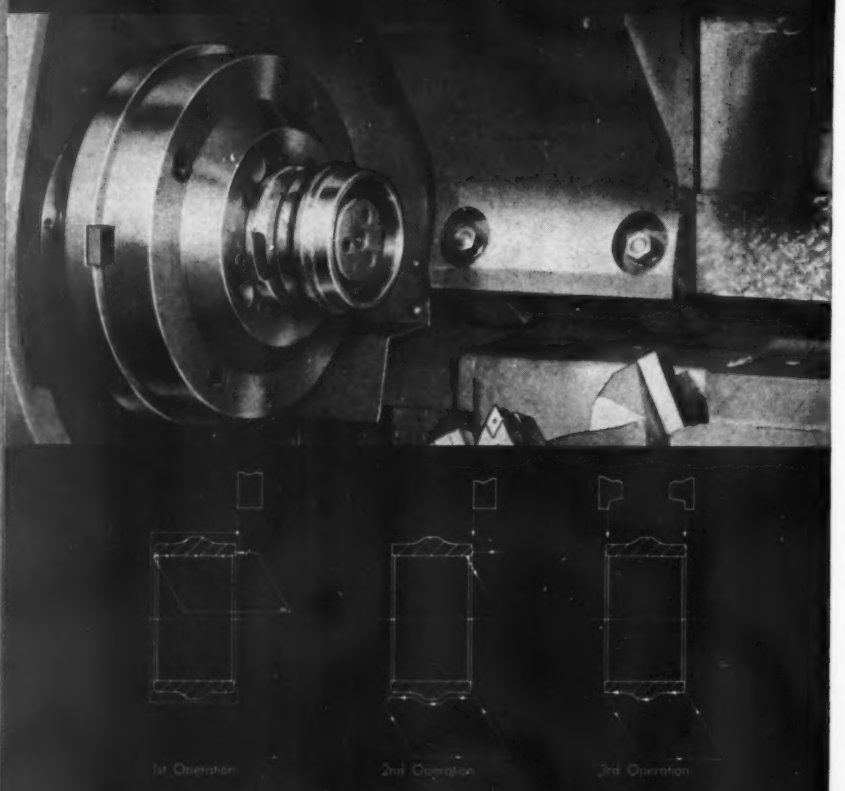
Opportunities like this for lower cost-per-piece exist in almost every plant, if you look for them. New Britain engineers are trained specialists, ready to cooperate in finding better methods.

See preceding two pages and two following pages for other New Britain *New's.*

New approach to bearing races

Single point turning on a New Britain +GF+ copying lathe





- **Three New Britain +GF+ lathes replace four other machines**
- **No costly form tools to buy and maintain**
- **Change-over time reduced 90%**
- **Total job time cut more than 50%**
- **Savings quickly pay for new machines**

Easy way to learn about the New Britain +GF+ copying lathe

Ask your New Britain representative for a showing of the color motion picture "A NEW APPROACH TO COPY TURNING" in your own plant. Or write The New Britain Machine Co., New Britain, Conn.

The NEW BRITAIN

Lucas attachment produces better finish in a fraction of former time

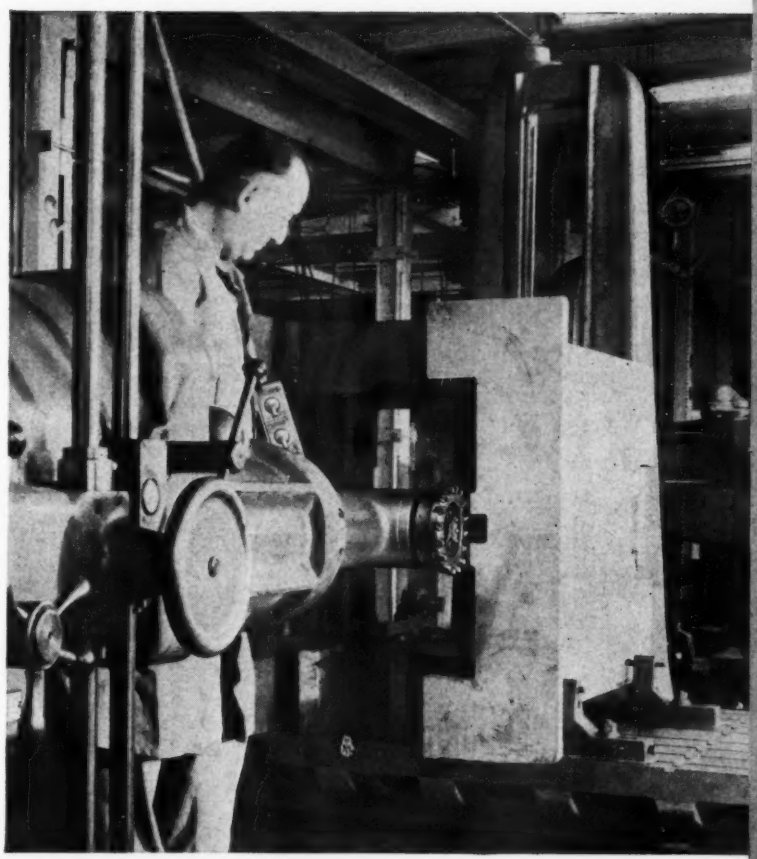
LUCAS OF CLEVELAND

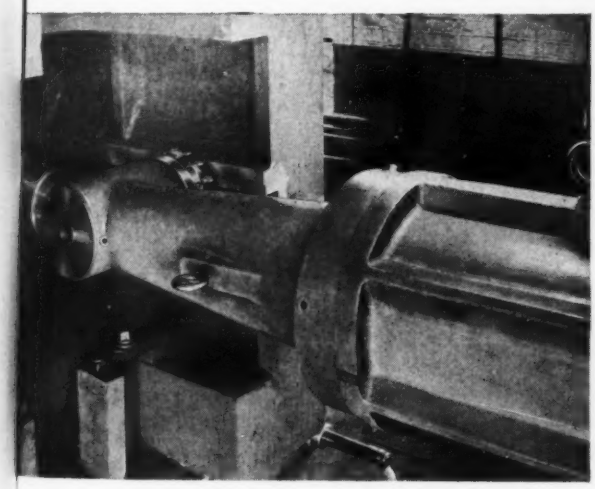
This Lucas Precision Horizontal Boring, Drilling and Milling Machine with angular milling attachment faces two opposing surfaces of this large casting with extreme precision. It machines both sides of the work with a simple 180° repositioning of the cutter — without resetting the job, or loss of accuracy.

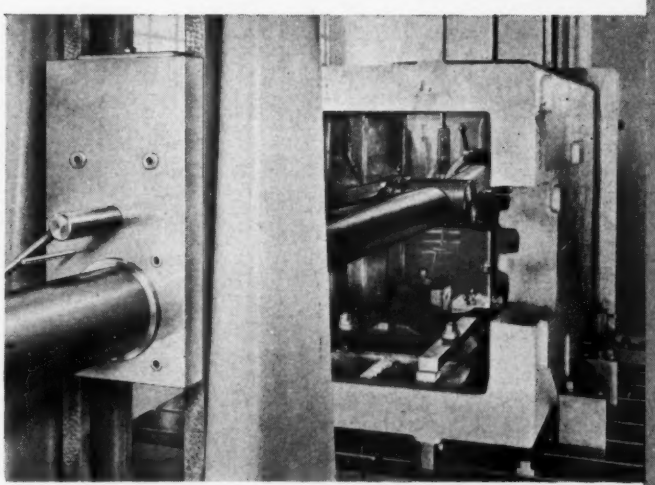
Performing these fine finish operations with the cutter over *four* feet away from the front bearings of the machine is an extreme test, but there is no chatter, and this job has been running for four years to the manufacturer's complete satisfaction.

Ask your Lucas representative for help on the jobs other horizontal boring mills can't handle.

LUCAS MACHINE DIVISION
The New Britain
Machine Company
Cleveland 8, Ohio





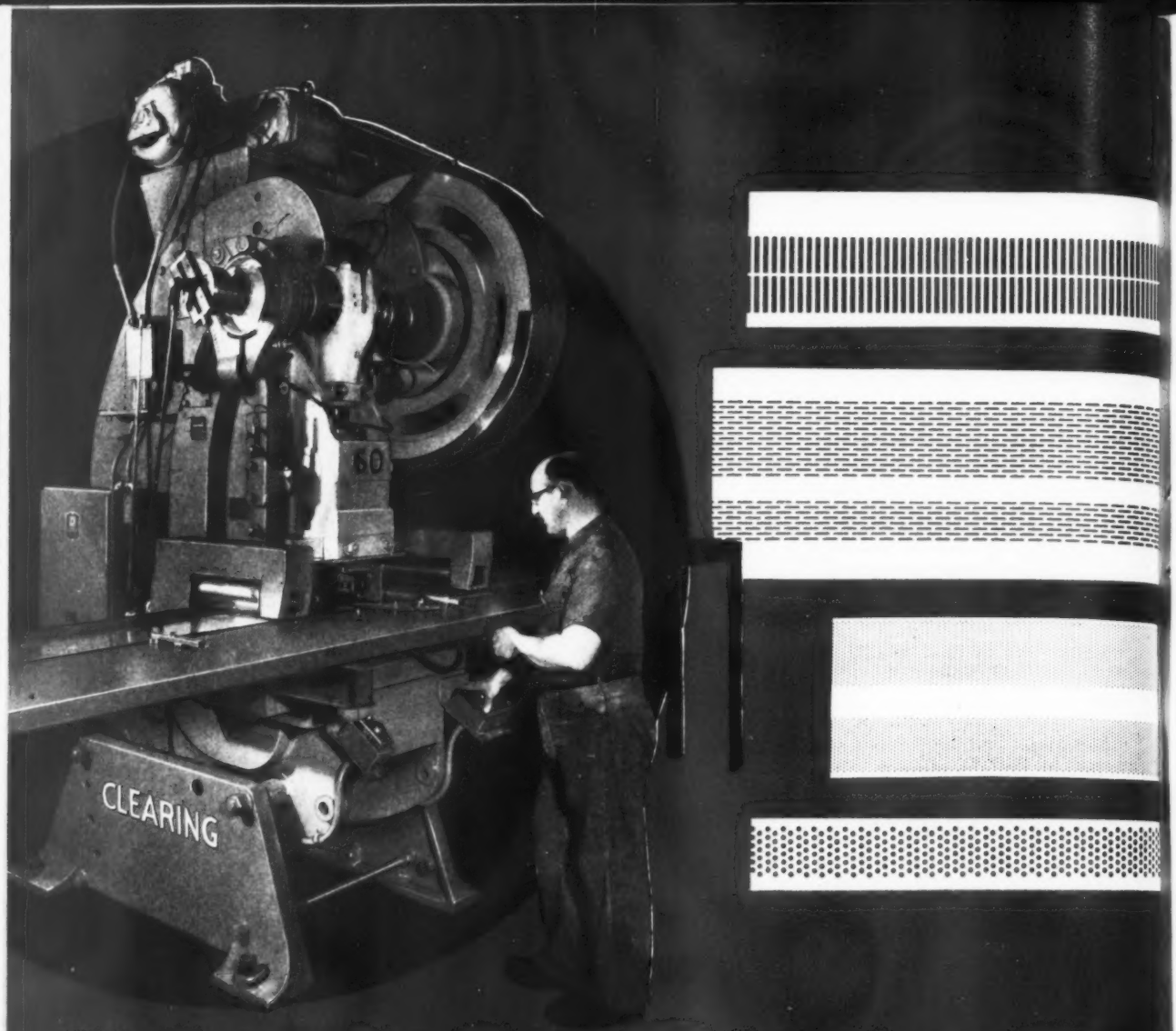


• AUTOMATIC BAR and CHUCKING MACHINES • PRECISION BORING MACHINES
• LUCAS HORIZONTAL BORING, DRILLING and MILLING MACHINES • NEW BRITAIN +GF+ COPYING LATHES

MACHINE COMPANY

New Britain-Gridley Machine Division, New Britain, Connecticut
Lucas Machine Division, Cleveland 8, Ohio

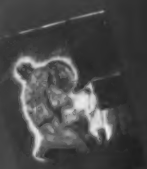
See the preceding four pages for other New Britain *New's*.



high production–60 tons' worth

Here's a story we Clearing O.B.I. love to tell. We're really putting all its weight on the Hussmann Refrigerator Company in St. Louis. Hussmann required a variety of patterns in ventilator panels for their line of commercial refrigerators. Instead of making each panel separately, they produce a continuous pattern from commercially feed strip steel. Simple die changes make it possible to change the pattern easily and quickly. An open end roll feed and cam-speed drive on the press gets top output out of every working hour.

There's a way that the efficiency of a Clearing O.B.I. can solve a production problem for you. It gives you the kind of versatile operation your operations will go for and the suggestions that comes through for you in the pinches. We'd be glad to talk to you personally about these things. Why not call us?



Write for your copy of Clearing's O.B.I. catalog. We'll send it promptly at no obligation.

CLEARING PRESSES THE WAY TO EFFICIENT MASS PRODUCTION

CLEARING MACHINE CORPORATION

DIVISION OF *U. S. INDUSTRIES, INC.* 6499 WEST 65TH STREET • CHICAGO 38, ILLINOIS • HAMILTON PLANT—HAMILTON, OHIO

VAULT

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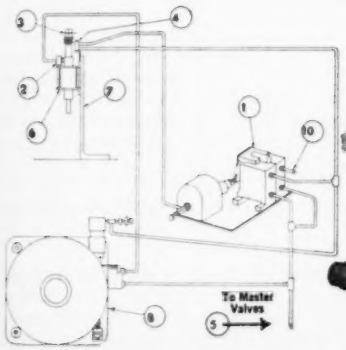
THE NEW IMPROVED *Fluid Feed* ROTARY WORK FEEDER *IN ACTION!*

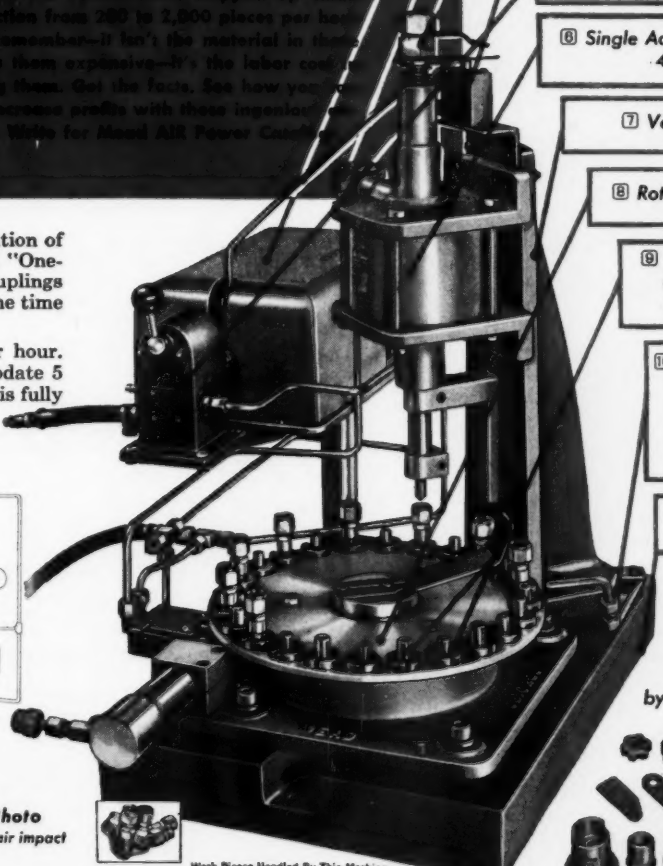
T[illegible] and rapid Mead Work Feeders—using clean, inexpensive Air Power—have stepped up small piece production from 200 to 2,000 pieces per hour. and more! Remember—it isn't the material in the "small piece" jobs that makes them expensive—it's the labor cost feeding, holding or assembling them. Get the facts. See how you save time, money, labor and increase profits with these ingenious operated MEAD Work Feeders. Write for Mead AIR Power Catalog

A simple and inexpensive combination of Mead pneumatic devices makes a "One-Man Factory" to assemble brass couplings by flaring neck into nut, at the same time forming a fluid-tight seat.

Output approximately 2500 per hour. Two sets of 12 mandrels accommodate 5 different styles and sizes. Operation is fully automatic except for loading.



Circuit Diagram of Units in This Photo
Combine readily to feed work to drill press, air impact hammer for a wide variety of operations.



Work Pieces Handled By This Machine

1. Model 2 Meadmatic Timer
2. #2 Quick Exhaust Valve to speed up return stroke
3. Adjustable depth stop with spring return
4. Cycle release valve (included with timer) to reverse cycle at end of down stroke
5. 4-B Master Valve starts and stops entire system
6. Single Acting Cylinder, 4" bore
7. Vertical Stand
8. Rotary Work Feeder
9. Alternate mandrels for two sizes of brass couplings
10. Air blast ejection of finished parts, by jet piped from second of two valves in timer
11. Universal Base

Typical Work Pieces Handled *by Mead work feeders*

MEAD SPECIALTIES COMPANY, Dept. HA-115, 4114 No. Knox Ave., Chicago 41, Ill.

Memo Coupon

MEAD SPECIALTIES CO.
4114 N. Knox Ave., DEPT. HA-115, Chicago 41, Ill.

Send free copy of new, colored MEAD INDUSTRIAL AIR POWER CATALOG describing the complete line of famous Mead air-operated devices.

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Company_____

Address_____

City_____ Zone____ State_____

CIRCLE INFORM-A-GRAM KEY NO. 41

HOW 3-D MICRO-VISION HELPS FAIRCHILD

manufacture world's tiniest production-run potentiometer

In a case less than ½" in diameter, 35 sub-miniature parts are precision-assembled; hair-thin springs are welded into fine slots. This tiny unit, designed and developed by the Guided Missiles Division of Hughes Aircraft Company, is a sensing and controlling element for aircraft and missiles; critical tests must assure highest mechanical and electrical efficiency.

Fairchild Camera and Instrument Corporation attributes the efficient mass-production of this unit to the use of Bausch & Lomb Stereomicroscopes—in assembly, inspection, and quality control. "Operators have both hands free and use both eyes to obtain normal, three-dimensional vision magnified to the required power—with high efficiency and operator comfort."

Write for FREE Copy of this Exclusive 3-D Micro-Vision Data Book

- See actual stereo views!
- Know *how* and *where* to use Stereomicroscopes!
- Fit exact model to job needs with Selector-Chart!

BAUSCH & LOMB
SINCE 1853

America's only complete optical source . . . from glass to finished product.

WRITE TODAY for Data Book D-15. Bausch & Lomb Optical Co., 77347 St. Paul St., Rochester 2, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 42

. . . Month's Talk, from page 34

more uniform and that quality will be raised. Eventually it will mean a lowering of prices and broadening of markets for our products. Improved machinery and increased application of power to production has always meant these things — and that evolutionary process is not going to be reversed at this late date.

At many stages in our nation's history we Americans have been just plain lucky. Now in connection with automation we are being smiled upon by Lady Luck once more. We are getting a terrifically fortunate break in timing. The tremendous improvement in automatic machine methods now taking place comes at a time when a relatively low number of people are being added to our working population. It has been estimated that in the next twenty years the population as a whole will increase by 20% whereas the number of people between the ages of 20 and 65 will increase by only 6%. The young men and women now coming of age and entering the working force were born in the depression years when the birth rate was low, and it will be ten to twenty years before those born since the war become workers. We will add many millions of older people and children to the population during the next twenty years, but relatively few of working age. The population is growing fast at both ends and slow in the middle.

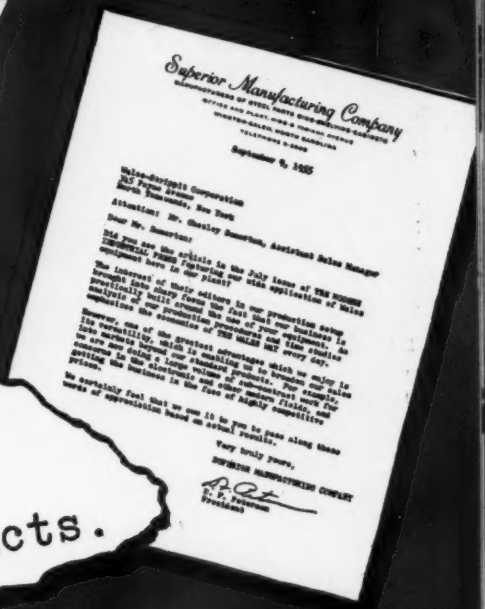
Our country is growing at an annual rate approaching three million people — enough to populate a new Cleveland and a new Detroit every year. This is a staggering fact, and we can consider ourselves very fortunate that with all the work we have to do in providing for this increase in population, we are adding so rapidly to the efficiency of our production.

There are many other reasons why automation is a blessing and not a threat of any kind to anybody. Manufacturing provides about 29 out of every 100 jobs in this country. A hundred years ago only 12 out of every 100 jobs were in manufacturing. The trend has been steadily upward and isn't likely to change in the years ahead, because as you make machines more efficient, you increase markets and also increase the activity and employment in the factory and in the industries that supply the factory with materials, parts, power and services. But even if employment were to drop to some extent in the factory, it would be absorbed readily by other segments of the economy that has been growing even faster than manufacturing. I refer to the service activities, including all those connected with transportation and with tourist and vacation activities. Consider, for instance, how many jobs are created

VERSATILITY

The Wales Way

OF PUNCHING AND NOTCHING


Superior Manufacturing Company

"...enables us to broaden our sales into markets beyond our standard products."

"Our business is practically built around the use of Wales equipment", stated D. F. Peterson, President, in commenting on the many advantages which equal in importance the time and cost savings made possible by THE WALES WAY.

In addition to manufacturing steel cabinets, shelving and storage equipment, Superior has been able to tool up for and deliver contract work in volume and at competitive prices, thanks to the versatility of Wales punching and notching equipment.

Steel cabinets or shelving...television or what have you,—*you too* will discover pyramiding savings in lowered tooling cost, tool inventory, tool investment and cost per piece.

Wales Analysis Service Reveals Cost Reductions

Men alert to today's necessity for *doing something* about today's rising costs are invited to take advantage of Wales cost Reduction Analysis Service.

A nationwide group of Wales engineers is qualified to study your present methods as contrasted to THE WALES WAY. An appointment incurs no obligation, phone or write today.

WALES-STRIPPIT CORPORATION

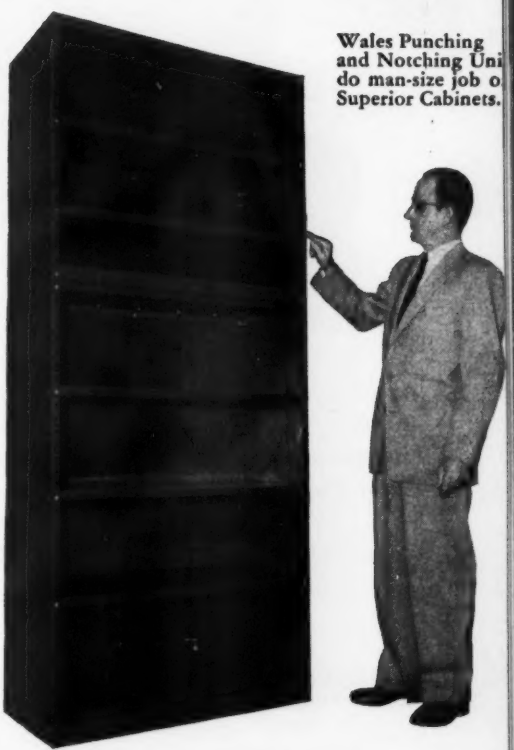
George F. Wales, Chairman

Payne Avenue, North Tonawanda, N. Y.

(Between Buffalo and Niagara Falls)

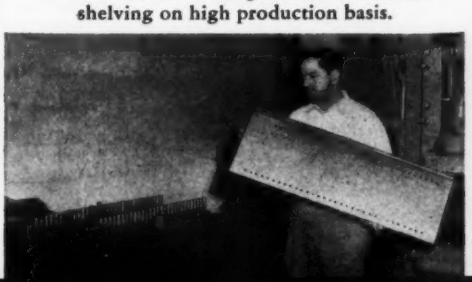
WALES-STRIPPIT OF CANADA LTD., HAMILTON, ONTARIO

Specialists in Punching and Notching Equipment


Wales Punching and Notching Uni do man-size job o Superior Cabinets.

Contract work speeded up with versatile Wales Fabricator

THE WALES WAY punches 73 holes in shelving on high production basis.



Wales self-stripping hole punching units punch 56 holes in two strokes.

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by Parker

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. . . and economy!

Pharmaceutical people lay down the most exacting requirements. That's why Parker was given the challenge to design and build this super-special marking machine. Dial operated, it marked 60 needle holders per minute—no trial and error—every impression perfect! That's our story. What's your problem? Parker can do the same for you.

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THE PARKER STAMP WORKS, INC.
by Parker
MARKING DIE & MACHINERY DIV.
FRANKLIN AVENUE • HARTFORD, CONNECTICUT

CIRCLE INFORM-A-GRAM KEY NO. 44

in the service stations, garages, and dealerships of the nation every time we add a million automobiles to the car population of our country. Or consider the number of jobs that will be created if and when that all-important expanded highway program gets under way. Our concern is not the displacement of workers, but finding enough people to do the nation's work. The last thing we should worry about is becoming more productive and more efficient. That's one way our country and its people just can't lose.

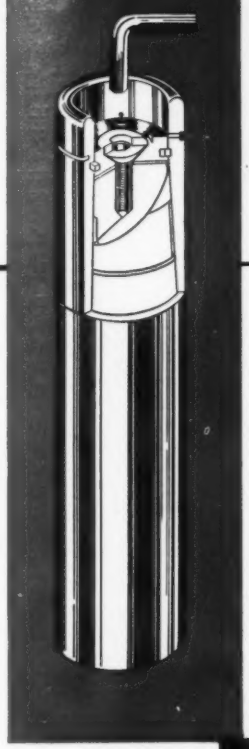
Volumation, Not Automation

Automation is helping us produce the things we need in greater volume and higher quality and at prices more and more people can afford to pay. This is the tried and true path of economic progress in America. Maybe we ought to talk less about automation and more about "volumation" — because it is producing and distributing quality goods in mass volume that is the end result and primary purpose of automation. Let's put first things first.

With all the publicity that has been given to automation recently, people may be forgetting about some of the other developments which are creating this new era in machine technology. Among these developments some of the most interesting are those which are bringing us closer and closer to what might be called "chipless" production.

You remember the time not too long ago when no piece of equipment could be called a machine tool unless it was used to cut a piece of metal into a desired shape. That definition is no longer being used in the machine tool industry, though you will still find something like it in the dictionary. The reason for the change is that the newer arts of precision casting, forging, and cold drawing of metals are developing very fast. Before long we are going to know a lot more about squeezing, pushing, and pulling metal into the shapes we want so that very little machining will be required. In a few years we may look back on our present method of machining rough castings and forgings as a somewhat quaint and old-fashioned way of doing things.

Take die casting as an example of the progress that is being made in the direction of the precision forming of metal. It seems like only yesterday that die castings were limited to parts weighing 8 to 10 lbs. New techniques have made die castings of 75 lbs entirely practicable. With this new art developing so fast, it is feasible, for instance, to look forward to die-cast automotive engine blocks made of aluminum and alloyed with zinc and weighing less than 100 lbs.



One Man Removes Large Punch Holder in 3 Minutes!

with SUPERIOR

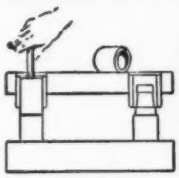
REMOVABLE CAP GUIDE PINS

End Troublesome Binding in Die Set Assembly

Superior's Removable Cap Guide Pins eliminate punch holder binding on guide posts when parting dies. The cap is removed from the pin merely by loosening a socket head screw which holds the cap in place. This frees the punch holder at the most critical point of the pin where it is apt to cock or bind. Instead of needing 2 or 3 die makers to remove the punch holder from a set, one man can easily do this work alone in a few minutes.

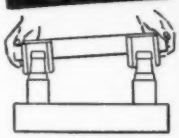
NOW OFFERED IN PIN DIAMETERS OF 1¼" UPWARD, AS STANDARD EQUIPMENT ON ALL SUPERIOR DIE SETS. SPECIFY IF DESIRED. WRITE FOR COMPLETE FREE INFORMATION.

FAST



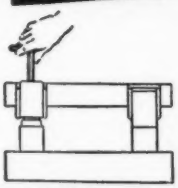
REMOVING CAP

SAFE

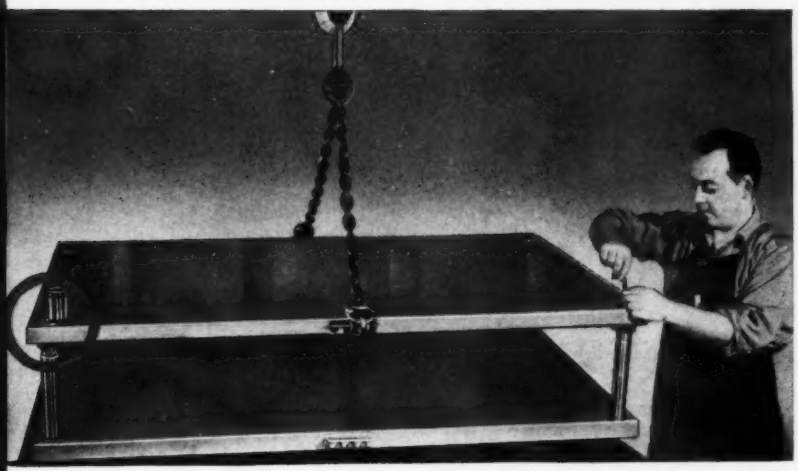


PARTING DIE SET

ACCURATE



REPLACING PUNCH HOLDER



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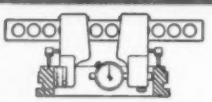
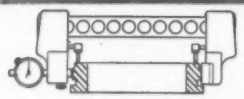


Gaging inside diameter

LENGTHS



Length gage

GROOVES, SLOTS, SHOULDERS
with quick-change, blade type contacts

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Bench Stand

Bench Comparator

WITH BENCH STAND

0" to 3"
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with .0005 indicator as shown
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PRECISION GAGING EQUIPMENT

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By means of the revolutionary shell moulding process, parts are now being cast with such precision that we need to remove only thousandths of an inch where with conventional castings we machine off eighths of an inch.

We are finding that metals of almost any kind of hardness can be made to flow into desired forms under sufficient pressure. Even steel projectiles are now being shaped by the cold extrusion method, and a new process called Hydroforming is opening up a whole new range of possibilities.

These new methods of shaping metal hold such great promise that within 10 years most of our present manufacturing machinery may be completely out of date. Take, for instance, the stunning Transfermatic machinery such as that I described in Chrysler Corporation's new Plymouth engine plant.

Considering the possibilities of new materials for the engine block and the precision forming of camshafts, valves, crankshafts, and other components, the present machinery may be completely outmoded in a relatively short span of years.

Plastic Dies in Greater Use

One of the most venerable as well as one of the most costly pieces of equipment in the automobile industry is the steel die for stamping body components. It now begins to appear that this too will change in the near future. Several years ago Chrysler Corporation started experimenting with reinforced plastic dies. Within the past two years we pioneered in the practical application of these dies when we used them to stamp major body parts for our 1954 Dodge trucks. No steel dies were even made for this operation. All of the body stampings for the 1955 Crown Imperials were made on plastic dies. In the future we expect to use plastic dies for more and more of our models that are produced in moderate quantity. Even now they are good enough for runs of 20,000, and we believe this can be greatly improved. Plastic dies can be made in approximately a third of the time required to make steel dies and at a considerably lower cost.

In my opinion, the major technical problem for the manufacturer in this period of rapidly accelerating machine technology is to design his products in such a way as to take advantage of the many advances being made in the design of machine tools. Frequently the production engineer finds it impossible to take advantage of a new machining process because of the shape of the part to be manufactured. The designer who is familiar with the latest machine methods and who designs his product with those methods in mind can save his company many thousands and even millions of dollars. For

. . . *Continued on page 50*

FIELD REPORT: NO. 91

WHICH DIE STEEL WOULD YOU USE HERE to increase production from 100 to 23,000 parts?

Even after trying many different die steels, production averaged only about 100 pieces before this ring die had to be replaced.

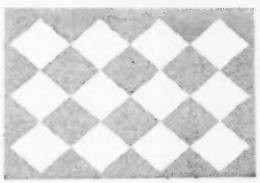
The die cold forms cups as the first operation in producing rocket projectile noses from SAE 1010 Steel. Even though the ring die is press fitted into a four foot diameter hardened retainer ring (Rc. 34/36), the 1700 tons of pressure exerted in power extrusion prematurely stretches the die. The 12 lb. 2 oz. cups must be held within .2 of a lb. and wall thickness within .010".

Which die steel would you specify in a move to cut replacement costs and improve production?

From our customer Field Report files, here's how the toolroom solved the problem. The Carpenter Matched Set Method showed that Carpenter VEGA (Air-Tough) Die Steel was a natural for the job. Latest report shows that the VEGA ring die had increased production from 100 to 23,000 cups, and is still banging them out.

What better guarantee of success can you find for your own jobs than the word of hundreds of toolroom men who rely on Carpenter. Why settle for "ordinary" results when Carpenter is ready to help you explore the possibility for improvement? Call your nearest Carpenter Mill-Branch Warehouse, Office or Distributor now. *The Carpenter Steel Co., 106 W. Bern St., Reading, Pa.*

How can <u>your</u> toolroom use Carpenter Matched Tool and Die Steels to:

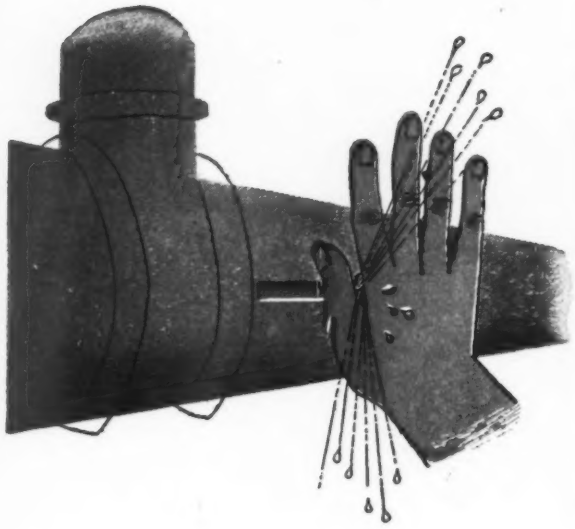


Reduce hardening hazards
Minimize machine downtime
Boost output per grind
Improve product quality

Carpenter STEEL

Matched Tool and Die Steels

IMMEDIATE DELIVERY from local warehouse stocks — Export Address: Port Washington, N. Y. — "CARSTEELCO"



a hole here means trouble...

a hole here saves trouble

Crucible Hollow Tool Steel Bars are a great trouble-saver for the metalworking industry. For they eliminate costly, time-consuming drilling, boring, cutting-off or rough-facing operations. And you save production time, machine capacity, and avoid scrap losses . . . for the hole is already in the steel you buy.

Crucible Hollow Tool Steel Bars are now available in any of our famous tool steel grades . . . in almost any combination of O.D. and I.D. sizes. And you get *immediate* delivery of five popular grades — KETOS oil-hardening, SANDERSON water-hardening, AIRDI 150 high-carbon high-chromium, AIRKOOL air-hardening, and NU DIE V hot-work tool steels.

Let your Crucible representative show you how these easy-to-use Crucible Hollow Tool Steel Bars can save you time and money. *Crucible Steel Company of America, Henry W. Oliver Building, Pittsburgh 30, Pa.*

CRUCIBLE first name in special purpose steels

Crucible Steel Company of America

CIRCLE INFORM-A-GRAM KEY NO. 48

Here's a real test for quality...if you can make the punch holder glide up the pins just by squeezing—and hold its position without sinking back—it shows that the fit between pins and bushings is well-nigh perfect. The "finger-tip" action is typical of all DIECO die sets small enough to squeeze this way...and the larger ones are just as perfectly fitted.

What does "quality" in a die set mean to you?

If it means a perfect fit between pins and bushings...shoes that are absolutely parallel and stay parallel under load...*all* parts finished to precise tolerances with such unfailing regularity that there is never any variation in accuracy and serviceability among different die sets from the same source...then it stands to reason you must already be a user of DIECO die sets.

- Hardened steel pins superfinished and individually gaged to 0.0002" tolerance.
- High-tensile steel shoes, stress relieved and precision machined.
- Choice of bronze-plated bushings on hardened steel backing or hardened steel bushings—all with grease fittings. Precision ground and micro-honed to less than a "tenth" tolerance; can be arranged for pressure lubrication.
- Welded or screw shanks; any length guide pin.
- 1728 combinations in steel or semi-steel; interchangeable parts speed delivery.

E. W. BLISS COMPANY

BLISS SINCE 1857

DIE SUPPLY DIVISION

DIECO

1400 Brookpark Road, Cleveland, Ohio

Industry's most complete line of die sets and die makers supplies

DIE SETS • GUIDE PINS • BUSHINGS • SPRINGS
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Speed production of precision parts with this simple, time-saving *optical* inspection tool. No complex set-ups, no holding fixtures needed for most work. With exclusive under-stage illumination you simply lay work on table—see accurately magnified silhouette at comfortable eye level. Performs equivalent of several different mechanical inspections in one quick, easy visual check. Instantly reveals costly production errors. Reads to .0001" with optional micrometer stage.

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BAUSCH & LOMB SINCE B&L 1853

Quality Control

INSTRUMENTS

CIRCLE INFORM-A-GRAM KEY NO. 50

. . . Month's Talk, from page 46

example, the simple precaution of designing a flange that turns out instead of in on an automobile body can make the difference between a manual or an automatic operation on the production line.

Keeping up with the free-wheeling revolution now taking place in the design of machine tools is going to be a terrific challenge to the product engineer and designer. No company can afford for a minute to ignore this challenge, because in the present competitive climate every cent that can be taken off the cost of a product without lowering its quality is important in keeping a company in the race.

But it is not only the product engineer who is being challenged by the rapid advances in machine technology. In addition, the whole production staff of every company, from foremen to master mechanics, and the entire planning staff will need to know enough about the capabilities of modern machine methods to make sure that the right equipment is being installed to do the company's work with the optimum results in terms of capital investment. It is almost as easy to overspend for machine equipment as to underspend.

One of the most difficult jobs of all is to set a company's sights high enough in relation to future markets to take full advantage of the efficiencies of modern machine methods —and to stimulate the company's marketing organization to achieve and maintain the volume of sales that will enable it to take advantage of large-scale investments in new machinery year after year.

The machine tool industry will continue to be indispensable to the product manufacturer in his efforts to take full advantage of current developments in machine technology. We rely on you to help keep us up to the minute. You know our needs. You know the capabilities of your industry. With things changing as fast as they are today it is in your interest as well as ours to keep us alive to the advantages of replacing old machines with new. We need your eyes and ears and your imagination as well as our own to keep this great creative revolution rolling. I know I can count on you to fill that need.

Another group that will help to maintain the momentum of the technological revolution is American labor. In all that has been said by labor leaders recently about automation and its meaning, I have not seen any statement attacking automation as such or suggesting that we slow down its development. So far so good. The main burden of most statements by labor leaders on this subject is that if gains in productivity are achieved by automation or other technological improvements, labor should reap the benefits of

"Home-made" Automatic Drill set-up cuts drilling cost from 2¢ to 1/10¢ per piece

Two standard Dumore Automatic Drill Units plus low-cost tooling boosts production for midwest die cast firm.

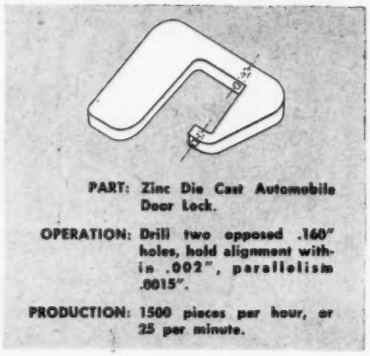
When Acme Die Casting Corp., Racine, Wisc., bid on a die cast zinc automobile door lock, their price hinged on maintaining high production rates on every phase of the operation. However, when hand drilling two opposed .160" holes, they found it impossible to hold the necessary .002" alignment tolerances as well as maintain the required high hourly production. They began looking for a solution.

Uses Dumore Advisory Service

Working closely with Dumore's Application Advisory Service, the company devised the special purpose machine pictured below. It consists of two Dumore Series 24 Automatic Drill Units designed into a completely automatic set-up that amounted to only a few hundred dollars in tooling and fixture costs. Complete synchronization of stroke, feed and drilling is made possible with effective use of micro-switches.

From 150 to 1500 pieces per hour

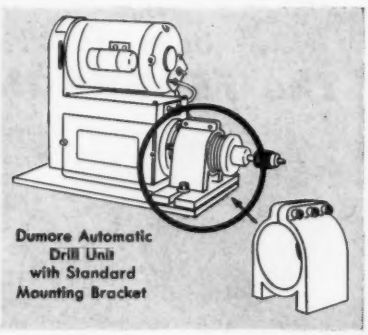
By increasing production from 150 to 1500 pieces per hour, drilling costs were reduced from 2c to 1/10c per piece. Operating at three shifts per day, the Dumore Units and tooling paid for themselves within a matter of weeks.



PART: Zinc Die Cast Automobile Door Lock.

OPERATION: Drill two opposed .160" holes, hold alignment within .002", parallelism .0015".

PRODUCTION: 1500 pieces per hour, or 25 per minute.



Dumore Automatic Drill Unit with Standard Mounting Bracket

QUICK REMOVAL and transfer of Dumore Units to other parts of the shop for drilling, tapping, reaming and other related operations is made possible with their unique nose mounting bracket. It quickly adapts Unit at any angle to existing shop equipment.

AN INEXPERIENCED OPERATOR loads the hopper while gravity feed forces the piece into the drilling fixture. The two opposed Dumore Automatic Drill Units advance simultaneously, drill, then retract to starting position—all automatically. The Dumore's built-in electrical and pneumatic controls permit almost unlimited set-up and production possibilities.

DUMORE®
PRECISION TOOLS

AUTOMATIC DRILL UNITS
TOOL POST AND HAND GRINDERS

1304 SEVENTEENTH ST., Rracine, WISCONSIN

Let Dumore's Application Advisory Service help you get increased production and lower costs on jobs like this. Write for FREE Dumore Application Analysis Kit.

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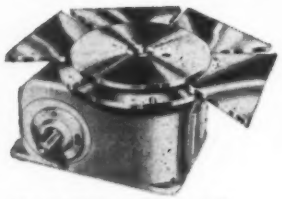
STANDARDIZED AUTOMATION!

Standard 12 stop Intermittor with specially jig-bored 36" dial.

HIGH SPEED INDEX TABLES FOR LARGE VOLUME PRODUCTION

Up to 30,000 Pieces per Hour with

The FERGUSON INTERMITTOR!



Standard 6 stop Intermittor with 12" dial and optional tool mounting brackets.

OVER 150 STANDARD MODELS TO CHOOSE FROM:

NO. OF STATIONS
4, 6, 8, 12, 16, 24, 36

DIAL SIZE
12", 18", 24", 30", 36", 48

INDEXING TIME
¼, ⅓, ½, ¾ of cycle

COMPLETE CATALOG

Every engineer should have a copy of Catalog No. 300 which gives load ratings and all dimensions of more than 150 standard Intermittors. Send for your file copy today... no obligation.

The new standard Ferguson Intermittor is a *must* for operations such as machining, joining, forming, staking, piercing, assembling, testing and inspection that require a combination of high speeds, long dwell or work time, and smooth indexing.

There is a standard Intermittor for almost every application, offering a choice of stops, dial size, degree of movement; and a table for either extreme precision or high torque usage. Seldom do you have so much selection in a line of standard production machinery... with all of the benefits of standardization PLUS many of the advantages of custom designs! The Intermittor operates at speeds far greater than those possible with other types of index tables. The special acceleration characteristics of the FERGUSON ROLLER GEAR DRIVE insure smooth starting and stopping with little shock and vibration, at speeds up to 500 indexes per minute.

Save design time, simplify tooling, improve product quality and cut maintenance costs to rock bottom with the new Ferguson Intermittor... the "Packaged" precision index table for high speed production.

WRITE FOR CATALOG NO. 300

FERGUSON MACHINE & TOOL CO., INC.

ROLLER GEAR DIVISION, DEPT. HI-11 P. O. BOX 5841, ST. LOUIS 21, MO.

CIRCLE INFORM-A-GRAM KEY NO. 52

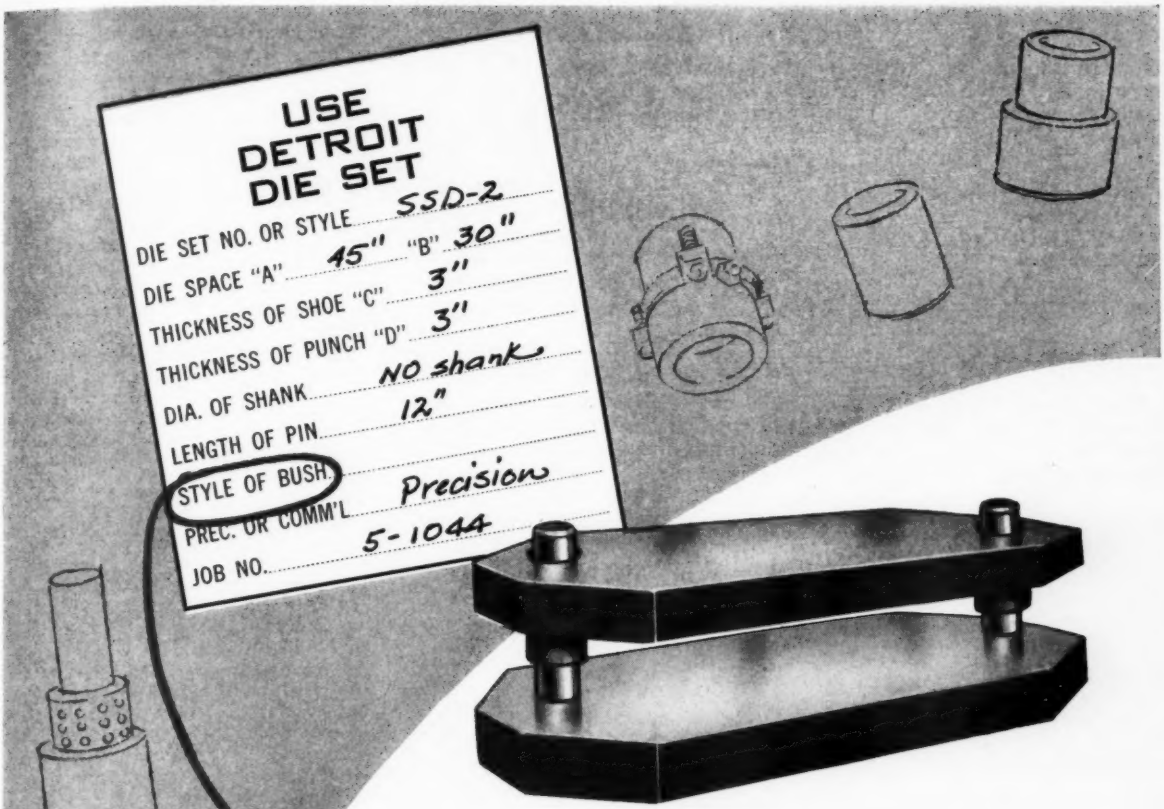
those gains. This is nothing new. If I were a labor leader I would probably take the same position and attempt to get as much for my people as possible. But being a part of management, I feel that it is in the interest of the working man to enable management to invest aggressively in improved productive equipment so as to enable industry to increase efficiency, improve quality, lower costs and widen markets. And this cannot be done if labor uses its power to force from industry too big a share of its revenue. There is no simple solution to this complex equation of interests. We shall go on as in the past — negotiating our differences and hoping that our negotiations will take place in an atmosphere of constructive and enlightened self interest.

To work together most effectively, all of these groups — labor, management, the product engineer, the production engineer, the machine tool designer and builder, and the machine tool distributor — should have the encouragement of their federal government. The most important single contribution that could be made by government in this connection would be a continued liberalizing of its attitude toward tax deductions for the depreciation of industrial machinery.

Gearing Tax Legislation To Machine Technology

Last year's tax legislation went a long way toward gearing our Government's policies on depreciation allowances to the realities of this age of accelerating advances in machine technology. By authorizing industry to use the declining balance method or the sum-of-the-digits method of computing depreciation allowances, the new law made it possible for industry to write off as much as three-fourths of the cost of new equipment during the first half of its estimated life. This was a much-needed advance over the straight-line method that had been the rule. Moreover, I understand that in administering the law the Bureau of Internal Revenue has recognized the need for a more liberal attitude than formerly in permitting companies to determine for themselves the useful life-span of a piece of equipment. In effect, the burden of proof in this matter has been shifted from the companies to the Treasury Department. And the time-honored Bulletin F, which lists recommended life-spans of equipment for tax purposes, is no longer looked upon as being fixed and immutable like the laws of the Medes and the Persians.

These are signal advances. They will contribute to the forward momentum of our economy in this revolutionary age by encouraging plant expansion and modernization.



How to get the type of bushings you want in *your* die sets

Best way to get the quality die sets you want *plus* the type of bushing and pin assembly you prefer is to stamp "USE DETROIT DIE SET" on your blueprints. For here, along with a *full-value* die set, you have a choice of a dozen different bushing assemblies. For instance, the new *self-oiling bushings* that automatically lubricate friction surfaces. And then such types as *ball-bearing assemblies, Lamina bronze-plated bushings* with or without clamps, and solid *Ampco bronze bushings* with Alemite fittings.

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It is of the greatest importance that these gains be maintained and that any efforts that may be made to go back to former tax policies be vigorously resisted. But it is also important that the Government be forcefully reminded that progress in this respect has only begun. We still have a long way to go before we catch up with the enlightened and forward-looking tax policies of such countries as Sweden, Switzerland, Germany, Belgium, England, Australia and Canada as they apply to this matter of depreciation allowances.

In this country the officials of our federal government still tend to base their judgment upon the experience of the past — not upon the unprecedented conditions of accelerating obsolescence which we are now experiencing. They are inclined to think about how long it used to take tools to wear out — not taking into full account the all-important fact that tools no longer wear out. You and I know that almost invariably the tools used by modern industry are replaced by new ones long before they show any serious signs of wear. I think we would all agree that the principal fact governing the depreciation rate of modern machinery is obsolescence. And this fact must be recognized by those who make and administer our tax laws.

Right now tax experts are preparing for a full-dress Congressional review of tax policies next winter. One of the subjects being studied is this matter of depreciation allowances. We can hope that the tax hearings will result — among other things — in further liberalizing the Government's and the country's way of thinking about depreciation. It is of the greatest importance that we keep tax policy in line with the realities of the present speed of change in machine technology. By encouraging industry to accelerate its progress in the use of machinery still further, government will actually expand the base of the economy and improve its own revenues. We all remember the surge of expansion in steel, in power and in many other segments of industry that resulted from the liberalized amortization program started after the outbreak of war in Korea to strengthen the nation's defense. What we need is an up-to-the-minute, realistic tax policy to keep industry expanding in time of peace.

What we are going to see here this week at the Machine Tool Show is more than a display of modern machinery. It is a panorama of the ideas of men made manifest in steel. Into the creation of these machines have gone the drive, the imagination, the idealism of men to whom machines are something more than gears and metal. Every man who has designed a piece of equipment

. . . *Continued on page 58*

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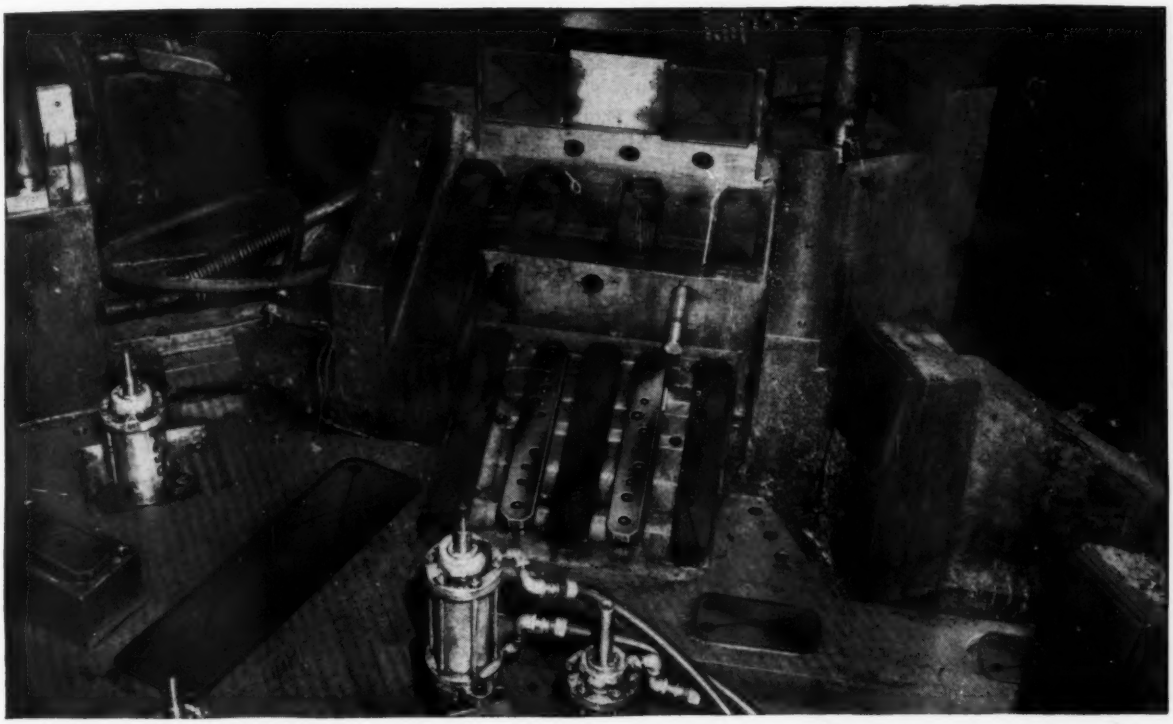

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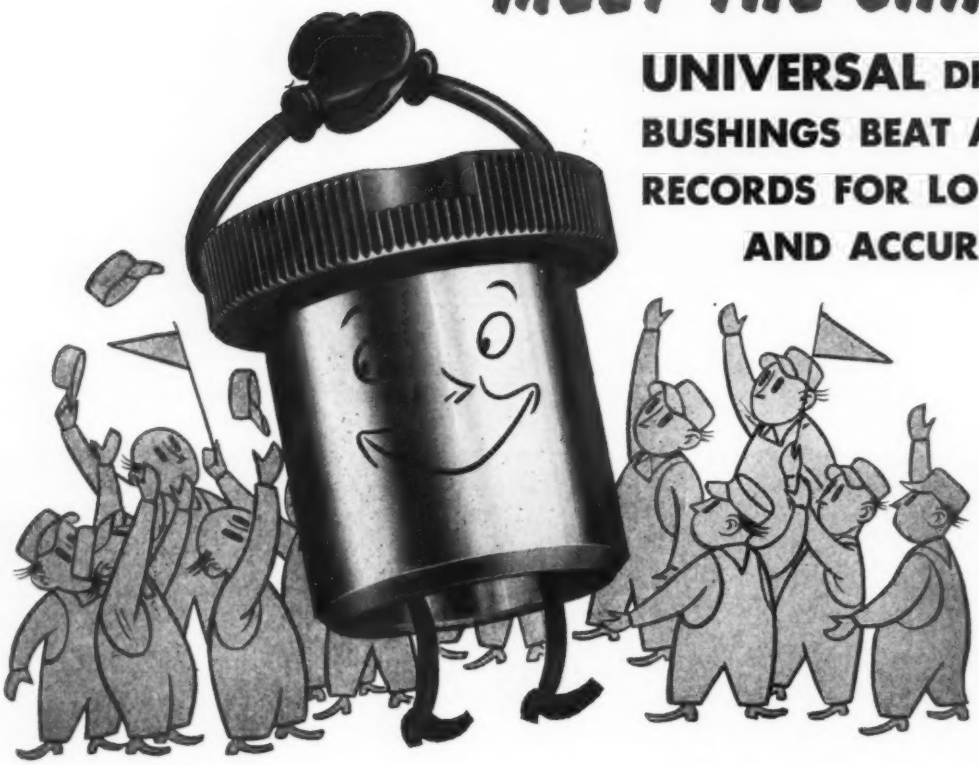
UNIVERSAL DRILL BUSHINGS BEAT ALL RECORDS FOR LONG LIFE AND ACCURACY



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and POWERFUL too

... that is why an Air Press does these jobs so well...

The Keller Compression Riveter is an efficient Air Press with 1⅝" stroke and up to 10 tons compression force. It does scores of jobs better and cheaper than other equipment because it has these advantages:

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LESS BENCH SPACE
LOWER INITIAL COST
LITTLE MAINTENANCE

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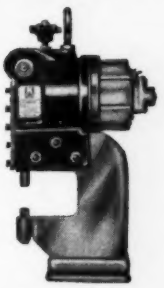
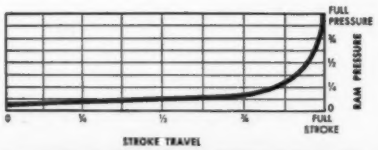
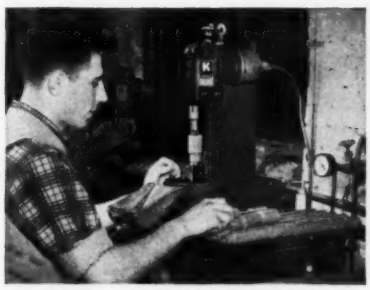


HERE IS CONTROLLED POWER

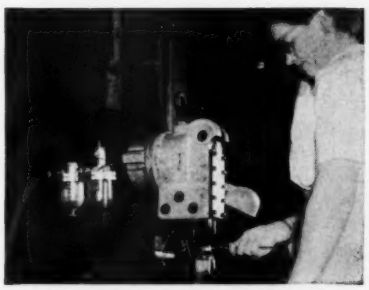


The Keller Compression Riveter delivers a squeeze—*not* a wallop! The chart at left shows how pressure builds up gradually along the length of the stroke, attaining maximum only at the very end. This gradual build-up of pressure avoids delivering a sharp impact which might distort small parts, or shatter fragile ones.

Assembling fragile plastic parts



Staking pins in electron tubes



Swaging small metal parts

GARDNER-DENVER Since 1859 K KELLER TOOLS

KELLER TOOL

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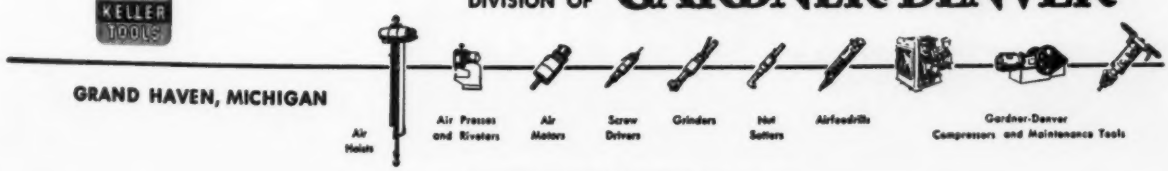

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Complete with foot treadle valve, hoses and fittings.

Exceptionally fast-acting new Heinrich Model 44 Air Vise is easy to set. Infinitely adjustable. Opens to 4¼"; jaw width 4"; travel ⅜". Grips with force 15 times air line pressure. See your Heinrich Dealer now!

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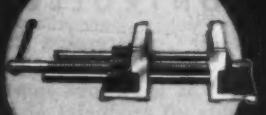

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Versatile, low-cost base structure for jigs and fixtures. Instantaneous setting, positive locking. Cuts tooling costs up to 75%.

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CIRCLE INFORM-A-GRAM KEY NO. 58

. . . Month's Talk, from page 54

in the present show knows that before another show year rolls around his design will belong to the obsoleted past. A few of them no doubt have on their drawing boards creations that have already obsoleted some of the machines on exhibition. Such is the world of machine technology. But it is this very speed with which we improve and change that provides the free world with the strength to preserve its freedom. It is this accelerating technological progress that builds opportunity for free men to work out their own individual destiny as they see fit. And for all of us who earn a living designing or selling or putting to use these magnificent mechanical creations there comes a great measure of added satisfaction in this larger and deeper meaning of our work.

New Automatic High Production Cut-off Machine

This new nonferrous metal cut-off machine, the Model M-16 built by the Stone Machinery Company, Manlius, New York is being used by a Brooklyn firm to cut brass solids of 1 sq in cross-sectional area, into ⅝" lengths at the rate of 12,000 per 8-hr day.

A check of its production showed that the Model M-16 had cut well over 90,000 pieces with an 80 tooth Si-Maloy steel saw blade — and the blade was still good. Tolerances were held to under .005" even with its high speed production.

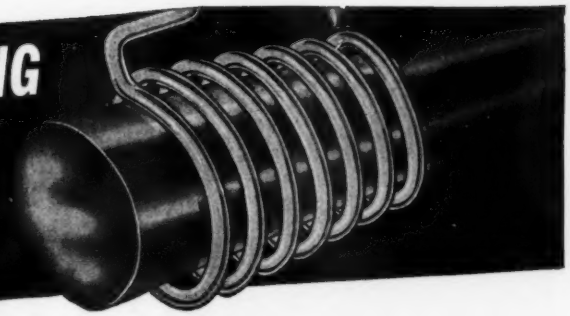
The machine has an automatic feed for bar stock and turns out work with a perfect milled-like finish. The machine is most compact for its capabilities, and can be set up to cut any desired lengths. This fully automatic model can also be furnished as a Stone Model M-75 — a larger cut-off machine for ferrous metals using an abrasive cut-off wheel.

YOU CAN HEAT ANYTHING

FROM A NEEDLE . . . TO

A TURBINE SHAFT

FASTER and BETTER



BRAZING

Permits widest choice of silver or copper brazing alloys from lowest to highest melting points. Ideal for brazing carbide tips.

HARDENING

Heat localized exactly where wanted at desired temperature. Ideal for gears, cams, bearing surfaces, cutting tools and other areas that are subject to wear.

SOLDERING

Speedily and neatly performs intricate soldering applications with or without the use of preformed rings.

ANNEALING

Ideal for annealing, stress-relieving, normalizing or preheating selected areas.

MELTING

Readily melts quantities of ferrous and non-ferrous metals in either graphite or ceramic crucibles.

WITH **LepeL**

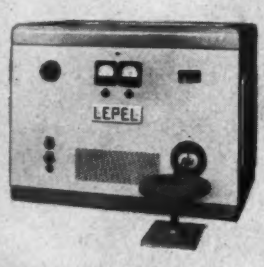
HIGH FREQUENCY

Induction

HEATING UNITS

The Lepel line of induction heating units represents the most advanced thought in the field of electronics as well as the most practical and efficient source of heat yet developed for industrial heating. With a background of half a century of electrical and metallurgical experience, the name Lepel has become the symbol for quality in induction heating equipment embodying the highest standards of engineering achievement, dependable low cost operation and safety.

If you are interested in the application of induction heating you are invited to send samples of the work with specifications of the operations to be performed. Our engineers will process these samples and return the completed job with full data and recommendations without any cost or obligation.



2½ KW INDUCTION HEATING UNIT

30 KW INDUCTION HEATING UNIT

100 KW INDUCTION HEATING UNIT

LEPEL Electronic Tube GENERATORS
1 KW; 2½ KW; 5 KW; 10 KW; 20 KW; 30 KW; 50 KW; 75 KW; 100 KW.

LEPEL Spark Gap Converters
2 KW; 4 KW; 7½ KW; 15 KW; 30 KW.

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WRITE FOR THE NEW LEPEL CATALOG . . . 36 illustrated pages packed with valuable information on high frequency induction heating.

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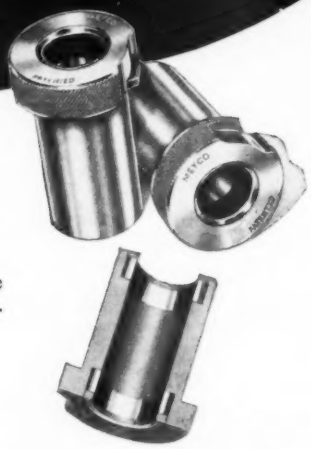
DOUBLE BARRELLED SAVINGS with MEYCO carbide application "Know How"



MEYCO
CARBIDE INSERTED DRILL JIG BUSHINGS

The most practical bushing ever made for high production and maximum accurate life, at lowest unit cost.

MEYCO
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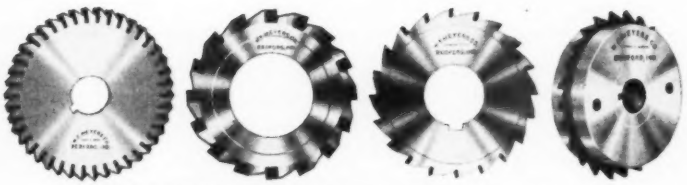
Precision tools for more production per grind. Meyco production and engineering skill makes the difference. Made to your specifications—inquiries invited for prompt quotation.



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For grooving, slitting, commutator undercutting and other operations to meet the requirements of your own individual applications: Solid carbide or carbide tipped.

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- ☐ Meyco Precision Circular Cutters
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MANUFACTURING MEMOS

New Research Centers . . .

● Plans for the construction of a multi-million-dollar Borg-Warner Research Center in Des Plaines, Ill., have been announced. It will contain facilities for metallurgical, electronic, chemical, hydraulic, physics, nuclear, and other research. In addition the laboratory will house a machine and model shop, a modern computation center, and a large technical reference library.

● The first of three major units in Battelle Institute's new atomic energy research center has been completed. Known as a "hot cell" laboratory, it's the first of its capacity to be built without Federal funds.

Corporation Formed . . .

● The assets and business of Niles-Bement-Pond Company, recently merged into Penn-Texas Corporation, have been transferred to a newly formed corporation, Pratt & Whitney Company, Inc. It will be a subsidiary of Penn-Texas, with Alexander H. d'Arcambal as president and general manager. Chandler-Evans will be a division and Potter & Johnston, a subsidiary of Pratt & Whitney.

Education, Honors, Savings . . .

● A. Lachlan Reed will step into the newly created position of director of industry-education relations for Minneapolis-Honeywell Regulator Company. He'll be responsible for coordinating corporation-wide activities and relations with schools, colleges, and universities.

● Honorary membership in The American Society of Mechanical Engineers has been awarded to seven men. They include Joseph Bradley Armitage, James H. Doolittle, Samuel Broadus Earle, and Simes Thurston Hoyt. Others named are Carl George Arthur Rosen, Philip Sporn, and Clyde Elmer Williams.

● A several-million-dollar cost reduction has been realized on the Air Force F/TF 102A program through the use of forgings. Various major fittings which were formerly machined from billets are now rough forged.

● In error, a September Memo stated that The Stanley Works had been acquired by three officials of Solar Steel. This group actually acquired a mill at Bridgeport, Conn., until recently operated by The Stanley Works, and now known as Precision Steel Corporation.

Formation of a new division devoted to body engineering has been announced by Pioneer Engineering & Manufacturing Company, Inc. It will be located in Pioneer's Goldner Division with C. E. Shutte as supervising engineer.

◆

J. L. Cranwell, vice president of Pennsylvania Railroad Company, was elected president of the American Standards Association. He will fill the post left vacant by the death of Edward T. Gushée.

◆

The name of Craig Machines, Inc. has been changed to Craig Systems, Inc.

◆

Industrial Tectonics, Inc. has purchased the manufacturing facilities of Anti-Friction Bearings Company in Los Angeles. Anti-Friction will continue as an independently-owned sales company.

◆

Kaiser Aluminum & Chemical Corporation has purchased an aluminum extrusion plant at Halethorpe, Md., from General Services Administration. Covering 270,000 sq. ft., the building houses five extrusion presses.

◆

The Black Diamond Saw & Machine Works, Inc. has acquired the stock and manufacturing rights of the Worcester Drill Grinder.

◆

The Greist Manufacturing Company has purchased the patent rights to the "Micro-Height" gage, from the Fairfield Gauge Company.

◆

A. J. Griner Company, Kansas City, Mo., a leading laboratory supplier in the West and Southwest, has been purchased by Chicago Apparatus Company, Inc. The Griner Co. and its subsidiary, A. J. Griner, Inc., will be operated independently of the Chicago firm.

◆

Walworth Company has acquired the assets and business of Southwest Fabricating & Welding Company, Inc., Houston, Texas. Southwest is one of the country's leading pipe fabricating companies.

◆

The British Oxygen Company Ltd., London, and The Aro Equipment Corporation, Bryan, O., have announced the formation of British Oxygen-Aro Equipment Ltd. The new company, with headquarters in London, will manufacture aircraft oxygen equipment.

Use postage-free Inform-A-Gram Key Number Card for your request

"Titanium" gives up-to-date data on the properties of this lightweight metal. Tables giving the mechanical properties of alloyed and unalloyed grades, and comparative properties of titanium and other pure metals are included. Methods of forging, annealing, rolling, and descaling and pickling titanium sponge in primary fabrication are discussed. Sheet forming, machining, grinding, sawing, and joining of the metal in secondary fabrication are also considered. Copies of Titanium Progress Report 2 can be obtained by writing to Pigment Dept., E.I. du Pont de Nemours & Co., Inc., Wilmington 98, Del. **Circle No. C1.**

"Design—With Microcast in Mind" outlines the steps involved in investment casting. The wide range of intricate parts that can be mass produced by the method are listed. The most recent table of the properties of investment cast alloys and the history of the process are also included in the booklet which is supplied by Austenal Laboratories, Inc., Microcast Div'n, 224 E. 39th St., New York, or — **Circle No. C2.**

A Pattern, Mold, and Model Making Machine Manual discusses the "Vacurator" process. This process is used to economically produce forming dies and molds, match plate patterns, duplicating machine patterns, etc. Vacurator facilities and the Vacurator 50-100 machine are also covered. Step-by-step instructions, complete with diagrams for specific applications, are contained in the manual from Guy P. Harvey & Son Corp., Leominster, Mass., or — **Circle Inform-A-Gram No. C3.**

Vacuum-Melted Metals and Alloys are featured in a 23-page technical bulletin issued by Carboloy. It covers the effects of vacuum melting on properties of various metallic materials, the benefits of the process, and fabricating and machining recommendations. Engineering data on two new vacuum-melted high temperature alloys, M-252 and J-1570, is also included. Bulletin VM-101 may be obtained from Carboloy Dept., General Electric Co., Detroit 32, or — **Inform-A-Gram No. C4.**

"How Temperatures Are Measured" covers heat and temperature as separate concepts. The physical effects associated with a rise in temperature and how thermometers and pyrometers use some of these effects are discussed. Monitoring surface temperature by means of changes in color or physical state is also considered. For your copy, contact Tempil° Corp., 132 W. 22nd St., New York 11, or — **Circle No. C5.**

Industrial Diamond Users will be interested in "Metallographic Polishing with Diamond", an informative guide. It cites the advantages of diamond abrasives over silicon carbides for rough grinding and final polishing. Pamphlet 2 containing graphs, charts, and diagrams which were compiled after laboratory tests, may be obtained by writing to Abrasives Div'n, Elgin National Watch Co., Elgin, Ill, or — **No. C6.**

To Aid Design Engineers in the use of cast heat resistant alloys, a comprehensive article, "Heat Resistant Cast High Alloys", has been reprinted. Creep strength, and 100-hr and 1000-hr rupture strength values are given for each grade considered, at 1400, 1600, 1800 and 2000°F. Copies are now available from Alloy Casting Institute, Mineola, N. Y. **Circle Inform-A-Gram No. C7.**

"How To Get More Accuracy" explains a new expanding method for holding parts while machining, gaging, and checking. This data sheet and catalog discusses the use of Martin expanders to improve the squareness and concentricity of machined parts. The new method is being used for internal and external grinding; precision turning, facing, and boring; gear shaping; and shaving and checking arbors and fixtures. Chas. J. Martin & Sons, 34130 Myrtle St., P.O. Box 710, Wayne, Mich., will supply copies, or — **Circle C8.**

A New Dynamatic Electronic Controls Bulletin is now available from Dynamatic Div'n, Eaton Mfg. Co., Kenosha, Wis. Bulletin EC-1 contains information on the installation, performance, and maintenance of the basic Dynamatic electronic control. The principles utilized to accomplish stepless speed control of Dynamatic "Eddy-Current" rotating equipment, using an AC line as the power source, are described in detail. Precise speed control in addition to many other features which provide individual control requirements are presented. Complete with illustrations, and circuit diagrams, this 16-page bulletin contains nontechnical, simplified information. **Circle Inform-A-Gram No. C9.**

The 1955 Occupational Services Guide released by the National Safety Council provides company safety directors with a complete catalog of the Council's varied accident prevention aids. It lists publications. training films, five-minute safety talks, and posters that are available. The manual gives not only the tools needed for building plant safety programs, but also training aids for instructing supervisors and workers. Information on the subjects covered in the basic and advanced courses of the Council's Safety Training Institute is also included. The 68-page manual is divided into sections which deal with safety in regard to the types of accidents and the industries involved. Copies of Service Guide 2.1 may be obtained by writing to the National Safety Council, 425 N. Michigan Ave., Chicago 11.

Will You Be There?

Oct. 31-Nov. 1. Fall Meeting of the Magnesium Association. Hotel Biltmore, New York City.

•

Nov. 2-4. National Fluid Power Association. Edgewater Beach Hotel, Chicago, Ill.

•

Nov. 3-6. National Tool & Die Manufacturers Association, Convention and Board Meeting. Statler Hotel, Detroit, Mich.

•

Nov. 7-9. American Society for Personnel Administration Seventh Annual Conference. Conrad Hilton, Chicago, Ill.

•

Nov. 9-11. 19th Annual Time and Motion Study and Management Clinic. Industrial Management Society. Hotel Sherman, Chicago, Ill.

•

Nov. 10-11. Annual Research Meeting of the Meehanite Foundries. Hotel Chase, St. Louis, Mo.

•

Nov. 14-17. Second International Automation Exposition. Chicago Navy Pier, Chicago, Ill.

•

Nov. 14-18. Power & Mechanical Engineering Show, Chicago, Ill.

•

Nov. 28-30. First National Exposition of Handicapped Persons Performing Job Operations. Palmer House, Chicago, Ill.

•

Nov. 28-Dec. 1. Air Conditioning & Refrigeration Exposition. Atlantic City Auditorium, Atlantic City, N. J.

•

Dec. 5-9. 25th Exposition of Chemical Industries. Convention Hall, Philadelphia, Pa.

•

Dec. 6-7. Sixth SPI Film, Sheeting and Coated Fabrics Division Conference. The Society of Plastics Industry, Inc. Hotel Commodore, New York City.

•

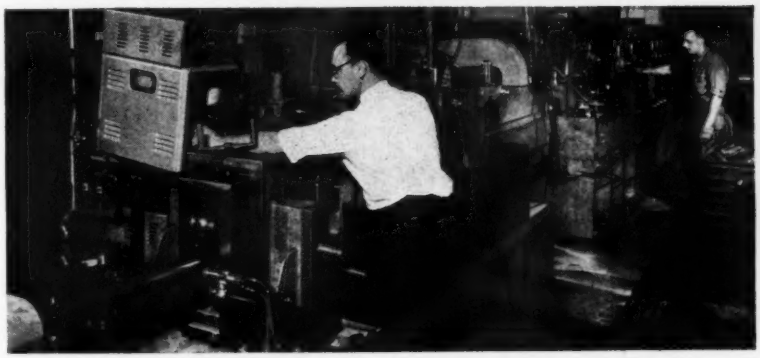
Dec. 10-16. Atomic Exposition. American Institute of Chemical Engineers. Cleveland Public Auditorium, Cleveland, Ohio.

•

Dec. 12-16. Nuclear Engineering & Science Congress. Engineers Joint Council. Cleveland Public Auditorium, Cleveland, Ohio.

Ultrasonic News

AUTOMATIC INSPECTION AND CONTROL ON CONTINUOUS PRODUCTION LINE



Continuous inspection of steel tubing and strip at production speeds is now an accomplished fact with the new Sperry Ultrasonic Reflectoscope® and RA attachment. This unit scans material traveling at high speeds and registers the presence of both internal and surface defects. Far more thorough than the human eye, it provides for both defect recording and signaling in addition to continuous inspection. Designed to incorporate signal lights or alarm bells, as well as automatic marking and machine cut-off units, the Sperry Reflectoscope and RA attachment is a flexible, accurate instrument which opens a new area to more effective cost-cutting quality control.

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A punch press attachment, which detects the slightest overloads caused by pile-ups, misfeeds, tool dullness, misalignment, the Sperry Protectron® minimizes tool and die damage by warning signals and actuation of control devices. The Protectron also cuts costly equipment damage and keeps all automatic machines running without close attention. With Protectron on guard, one man can safely and easily operate several machines at once.

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TP-11

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108 Shelter Rock Road
Danbury, Connecticut

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☐ Please send me complete information on the Sperry Protectron.

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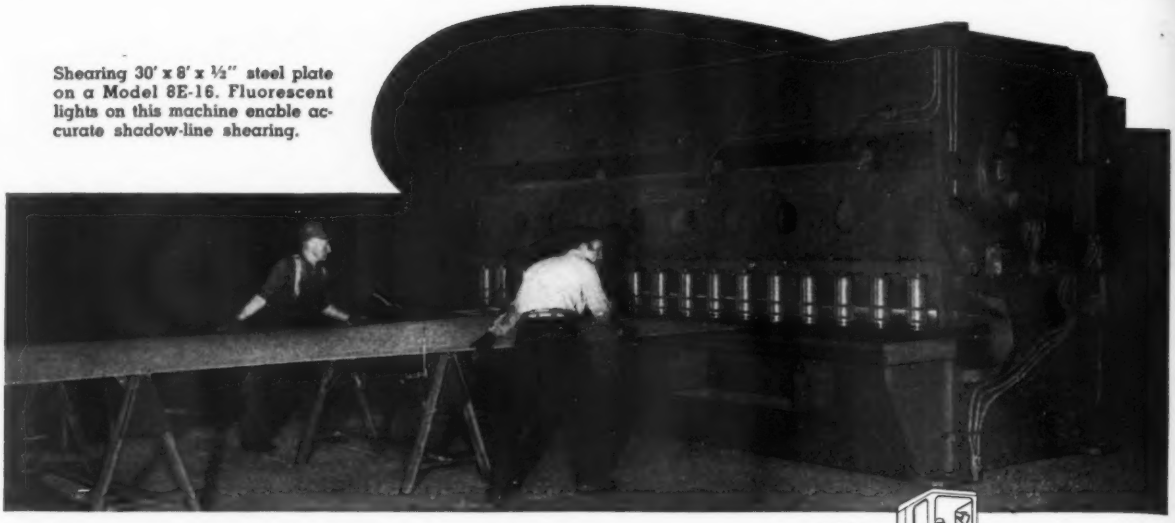
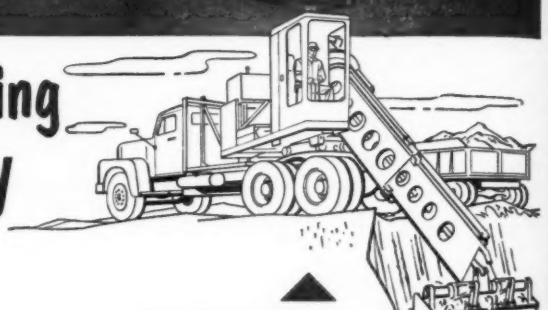


Shearing 30' x 8' x ½" steel plate on a Model 8E-16. Fluorescent lights on this machine enable accurate shadow-line shearing.

Smooth, Accurate Shearing Aids Warner & Swasey Gradall Production



Gradalls are made by the Gradall Division of The Warner & Swasey Company.

A Steelweld Pivoted-Blade Shear cuts all the plate used in the manufacture of Warner & Swasey's Gradall Multi-Purpose Earth-Moving Machines.

Because of the simple Micro-Set knife clearance adjustment it produces clean, sharp cuts to close tolerances in various thickness metals ranging from light gauge to ½".

The motor-driven back gauge is very popular with the operators because of the ease and speed with which it can be set. Simply by pushing buttons at the middle front of the machine and reading a dial which records to 1/64 inch, the gauge is quickly positioned exactly as required.

Steelweld Shears and Gradalls are alike in many respects: Heavy all-welded construction — Many new and revolutionary features — Entirely different in operating principle from other similar-purpose machines. Both speed the work and cut costs.

If you work with metal plate of any kind, you should have the facts on Steelweld Shears. A Steelweld representative will be glad to call on you at your convenience.

Dial and control buttons conveniently located at middle front of shear for setting motor-driven back gauge.

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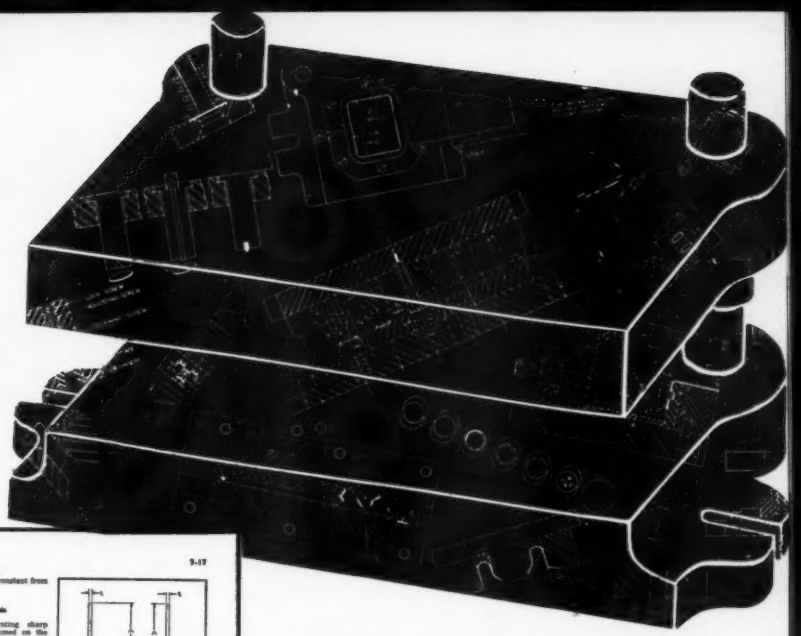

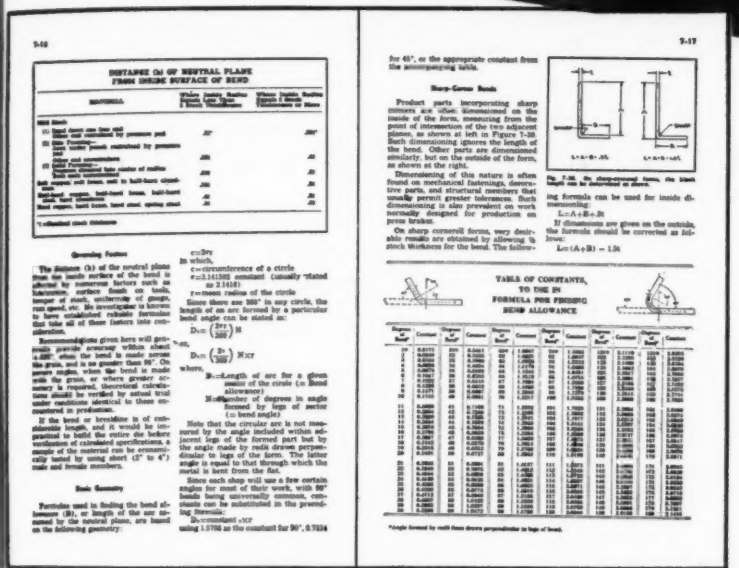

368 pages, 26 chapters, over 400 illustrations, charts and graphs. 165 Practical Points in Die Design and Construction. Comprehensively indexed.

Valuable to the die designer, engineer and die maker as a reference and refresher, and to the student and apprentice in classroom and on-the-job training.

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2 New CINCINNATI PRESS BRAKES

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FIFTY TON - - - - 3-50 SERIES

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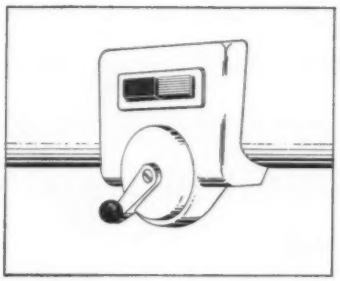
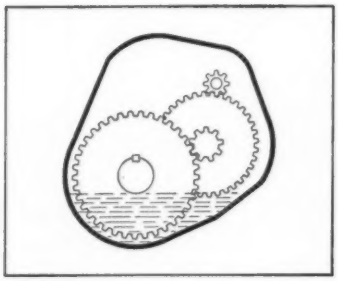
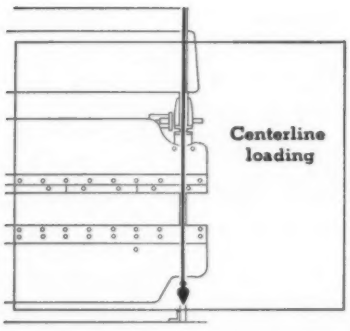


Front controlled, variable speed drive, 20 to 50 strokes per minute.

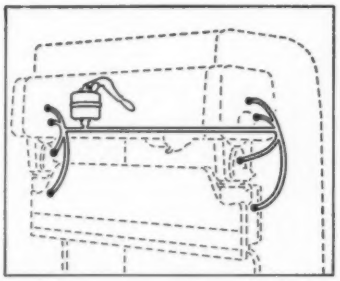


Completely enclosed transmission, running in oil.

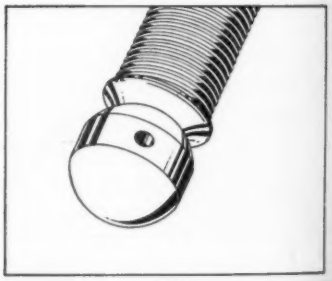
Two micrometer indicators, one at each end of the ram—easy to read and accurately record the amount of adjustment and tilt.



Centerline loading prevents weaving of the housings and insures accurate bends.



Centralized pressure lubrication system.



Ball end on the ram adjusting screws permits tapering of the ram for fade-out work.

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A. SHAPERS • SHEARS • BRAKES

2-30 SERIES

This new 2-30 Series Cincinnati All Steel Press Brake has a capacity of 14 gauge x 6′ mild steel.

Look at these unusual standard features:

2½″ stroke—12″ shut height—9″ throat.

Distance between housings 5′-2″—overall die surface, 6′-0″.

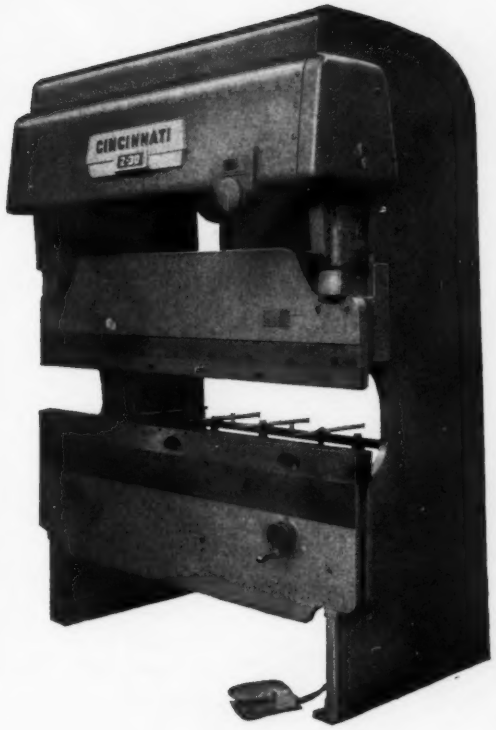
Front controlled, variable speed drive, 20 to 50 SPM. 4″ manual ram adjustment including ram tapering adjustment for fade-out work (power adjustment available as extra feature).

Bronze swivel end-guide bearing for accurate endwise alignment, even when tilting ram.

Brushless electro-magnetic brake and clutch.

Deep bed and ram, planed and drilled for 5¾″ angles.

Micrometer indicators on both ends of ram for fast, accurate setting.



3-50 SERIES

These new 3-50 Series Cincinnati All Steel Press Brakes are built in two lengths and have a capacity of 10 gauge x 6′ mild steel. Investigate these unusual standard features: 3″ stroke—12″ shut height—12″ throat—distance between housings 6′-6″ or 10′-6″—overall die surface 8′-0″ or 12′-0″—front controlled, variable speed drive, 20 to 50 SPM.

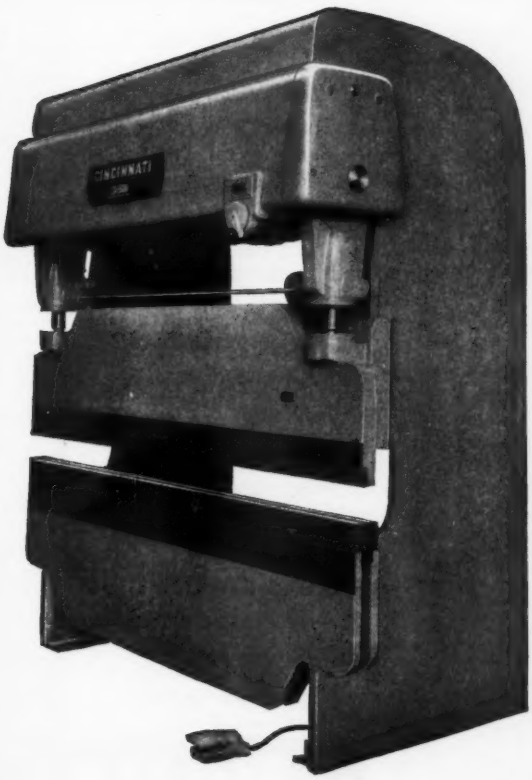
5″ motorized ram adjustment, including ram motor and control, complete with ram tapering adjustment for fade-out work.

Bronze swivel end-guide bearing for accurate endwise alignment, even when tilting ram.

Brushless electro-magnetic brake and clutch.

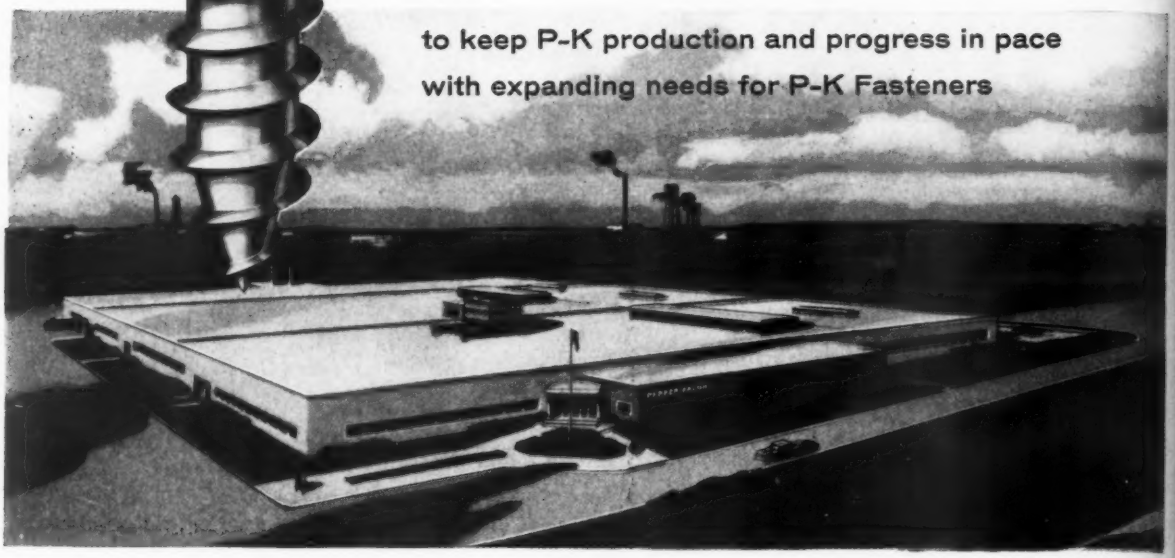
Deep bed and ram, planed and drilled for 5¾″ angles.

Micrometer indicators on both ends of ram for fast, accurate setting.



a new plant for PARKER-KALON

to keep P-K production and progress in pace with expanding needs for P-K Fasteners



In a few weeks, Parker-Kalon will move to its new plant in Clifton, New Jersey (about 10 miles from New York City). This modern building, containing 267,000 square feet on one floor, is one of the largest plants devoted exclusively to the manufacture of fasteners.

It is planned for the highest efficiency and economy in all operations,with production keyed to the steadily increasing demand for P-K Fasteners throughout industry. Advanced facilities for engineering and research will accelerate P-K progress in development of new and improved fasteners.

Now, more than ever, you can be sure . . . "If it's P-K . . . it's OK!"

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General American Transportation Corporation
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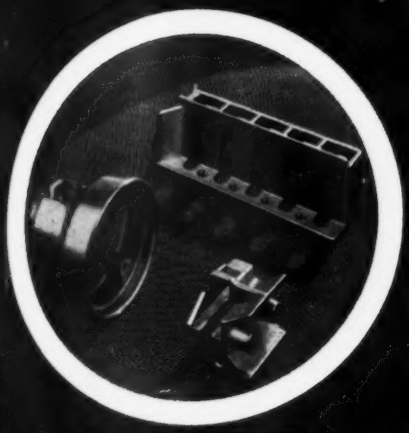
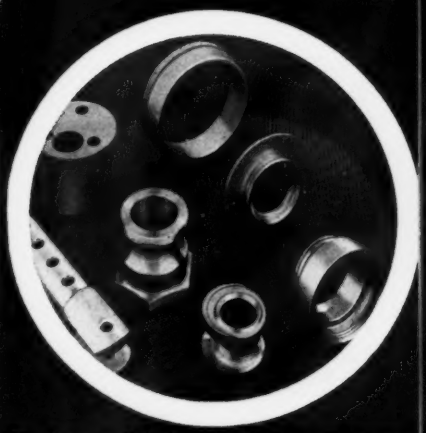


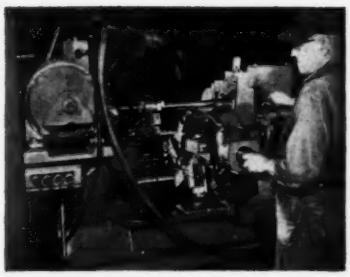
Titan brass pressure die castings

Titan brass and bronze forgings



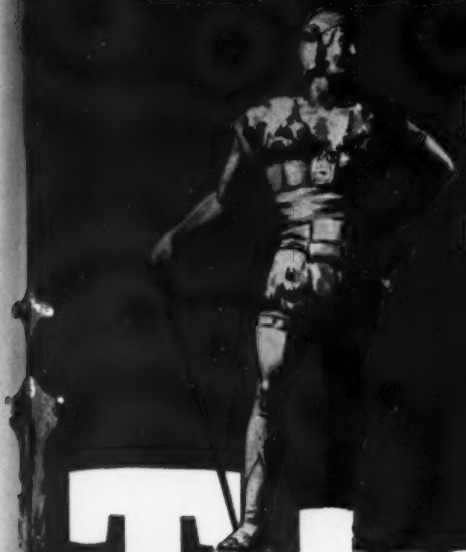
Titan brass and aluminum hand screw machine parts

One of Titan's modern automatic chucking machines for preparing brass and aluminum forgings to customer specifications. Titan performs all types of machining operations.



Accurately machining a Titan forging on a turret lathe. Titan fabricating operations cut customers' assembly costs.

Titan machined parts



have sparkle, economy and versatility

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Bellefonte, Pa. Offices and Agencies in Principal Cities

Appeal and usefulness of brass or aluminum forgings and pressure die castings are increased greatly by multiple drilling, reaming, tapping, gang-milling, turning, broaching or knurling at the skilled hands of Titan machinists.

Equipment includes turret lathes and automatic chucking machines for producing finished machine parts of volume, quality, economy and superb finish. For example, high-quality forgings are supplied by Titan ready for assembly—already precision-broached and gang-milled with multiple-drilled and tapped holes.

When smaller quantities of fabricated parts are needed, Titan hand screw machine facilities come into play. Here, holding to closest tolerances and precision requirements is regular practice.

Let us suggest how Titan machined parts may solve your assembly problems and cut costs. Write for more information. And send for new 40-page full-color booklet "Behind the Scenes." Use the coupon below.

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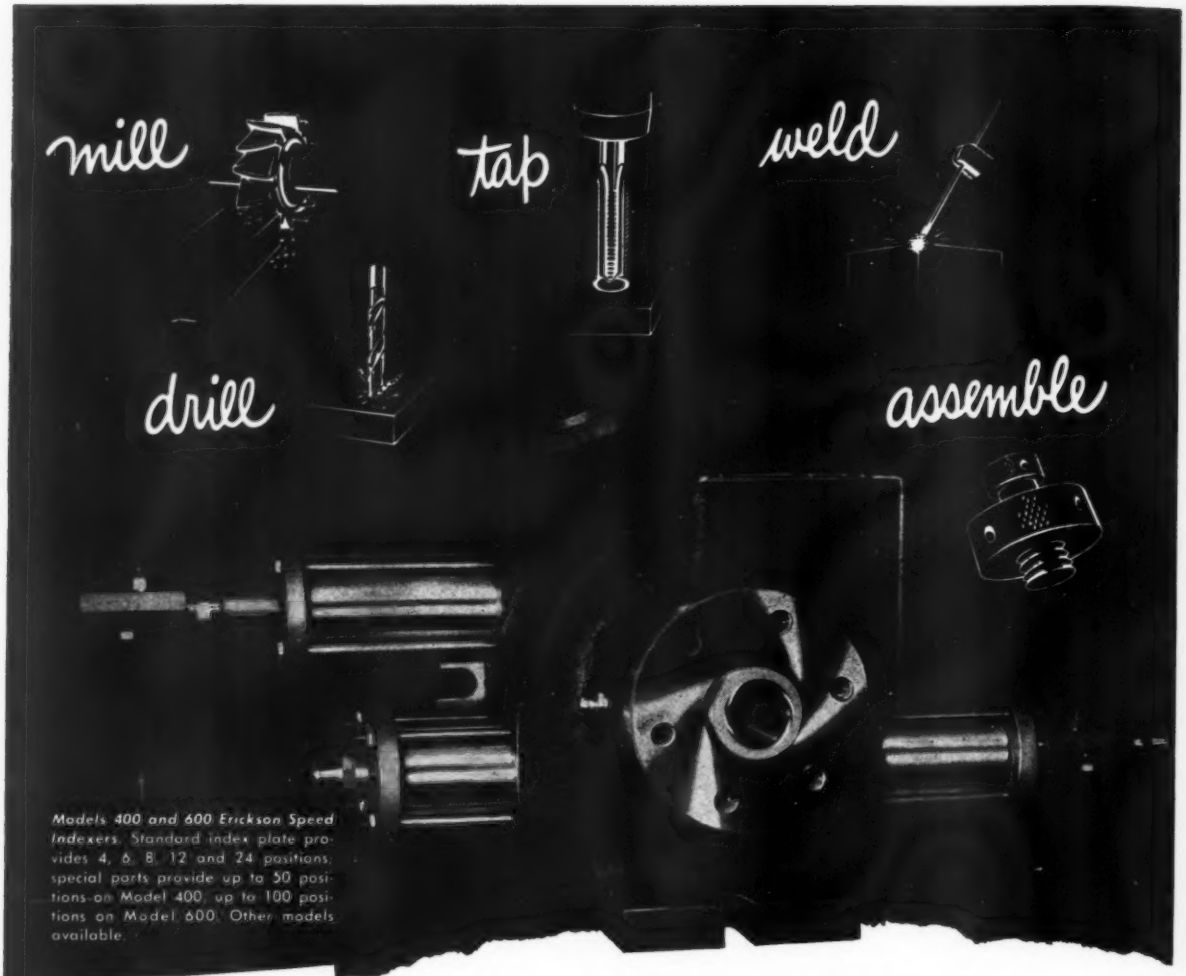


Models 400 and 600 Erickson Speed Indexers. Standard index plate provides 4, 6, 8, 12 and 24 positions; special parts provide up to 50 positions on Model 400, up to 100 positions on Model 600. Other models available.

Angular accuracy within 2 minutes... repetitive accuracy in low "tenths" of a thousandth

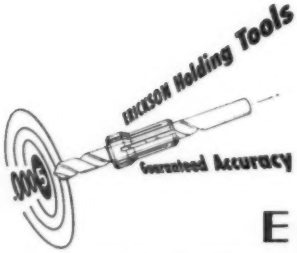
ERICKSON INDEXERS–

the economical way to smash automation bottlenecks

Even the most elaborate automatic production line can bog down *expensively* without rapid and accurate automatic parts positioning.

That's where Erickson Indexers really pay off. For you can interlock them into your production set-up with micro switches and solenoid valves. The hardened and ground lock pin operates in conjunction with the actuating mechanism to assure *positive positioning and angular accuracy within 2 minutes of a degree.* (Repetitive accuracy is no indication of angular accuracy. Erickson holds repetitive accuracy in low "tenths" of a thousandth.) And Erickson Indexers can maintain this great accuracy because their adjustable, self-contained shock control unit delivers a cushioned rotary load to the mechanism, thereby reducing wear.

Speed to keep lines moving . . . accuracy to reduce rejects . . . long life to cut maintenance and capital investment – all add up to Erickson Indexers, the *economical* way to smash automation bottlenecks.



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research and development - - the big pay-off

The material progress made in this country in a twenty-five year period is truly something wondrous to contemplate. We speak so smugly of that progress — we are so prone to take our standard of living for granted — we, as laymen, profess such familiarity with electrical and mechanical devices which, in reality, are far beyond our ken — that we lose sight of (if we ever truly appreciated) the years, brainpower and dollars devoted to the research and development that have made those wonders so commonplace.

We do not think we are being either naive or unduly impressionable in referring to our scientific servants of today as "wonders".

Whatever your business or hobby, pick the twenty-five year period during which you were most familiar with the status quo; railroading, domestic appliances, astronomy, textiles, earth moving equipment, vending machines — you name it. Imagine, if you can, that at the beginning of your twenty-five year run you had been told of the attainments to be made in twenty-five years. How would you have taken it? Can you honestly say that you would have believed half of it?

During those twenty-five years, the status quo wasn't very "status," was it? You found yourself hard-pressed to keep up with "the state of the art," as the patent attorneys put it. Anytime you found yourself thinking "this is it — there can't be any better, be anywhere left to go . . ." along came news of a development that obsoleted your thinking and actions. Waiting for an elevator became an imposition to be avoided by stepping on an escalator.

By looking upon such a period in perspective, you can compress those twenty-five years in your mind's eye into a fascinating package of successive wonders.

For this writer, one such wonderful package to contemplate ends in the mid-thirties with the witnessing of an early demonstration of television. My memory package opens with a boyhood trip to Duluth, Minn., where, atop the rock outcroppings that dominate the city's skyline, the two wooden masts of the North American Marconi Company supported a flat top aerial via which the dot and dash "brass pounders" talked with the boats on the Great Lakes.

Within that era of open spark gaps, helixes, loose couplers, and galena detectors, the colossal field of electronics as we know it today came into being. Air and marine navigational aids, automatic pilots, guided missile controls and color television, to say nothing of that humble black box — the highway speed spotter — all came from research individuals and development laboratories seeking to improve upon the successive stages of "wireless" apparatus.

Research and development are the voice of dissatisfaction with things as they are. They can be inspired by frustrations caused by astute competitors' aggressiveness or by customer complaints. (What a few hundred housewives can do to a new electric dishwasher would put a testing laboratory to shame.)

Research and development today are part and parcel of our free enterprise system. They have attained this status purely through the incontestable teachings of scientific and industrial history: those manufacturers who give free rein to research and development are the ones who have assumed leadership in their respective industries and who have gained recognition accordingly.

To all of this, here is a research project of tremendous and substantiating import. For many years Dr. Raymond Ewell of the National Science Foundation has researched the correlations between research spending and national productivity. His current findings are that over the course of twenty-five years, society gets back $2,500 to $5,000 for every $100 spent on research and development. What can hold us back?

E. Willard Pennington

editor

Editorial Index

DEPARTMENTS

SHOP AIDS 62
Need help in any aspect of modern metalworking? See this section for materials and design aids, inspection and production techniques.

PUBLICATION PREVIEWS 108
Capsule description of current literature. Bulletins, brochures, catalogues and circulars — You name it.

PROGRESS ON PARADE 148
Check this carefully. It can bring new efficiency to your operation. The newest in machines, tools, and accessories.

MAXIMUM SAFETY AND WORK EFFICIENCY

NEW CONCEPT IN PRESS BRAKE DESIGN

NEW! di-acro

Hydraulic Press Brake with *STROKE CONTROL

*STROKE CONTROL means that you set the most practical length of stroke for each job—60 strokes per minute at ¼" stroke, 24 strokes per minute at 1½" stroke. The cam shaft does not make a full revolution as is true with flywheel driven press brakes.

Regardless of length of stroke used, *the ram speed is always constant* to insure safe, smooth, efficient operation. No violent whipping action of material.

Twelve tons of smooth hydraulic power is applied through a mechanical cam drive which assures perfect, positive alignment of bed. Ram can be "inched" or immediately backed-off. Capacity is 16 gauge steel across 36" bed. Wide variety of standard dies in stock.

For short run or experimental work use the Di-Acro hand operated Press Brake. Eight tons of power forms 16 gauge steel across the 24" bed. Uses standard dies.

pronounced die-ack-ro

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O'NEIL-IRWIN MANUFACTURING CO.

315 8th AVENUE, LAKE CITY, MINN.

CIRCLE INFORM-A-GRAM KEY NO. 72

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— FEATURES —

FORGING DIES. "A Few Helpful Hints for Making Forging Dies." 92
Application of the metal cutting band saw in the building of forging dies is illustrated by several types of operations performed in a Cleveland forging plant.

DEEP DRAWING. "Press and Spinning Roll Operations Team Up for Greater Efficiency" by John H. Bauer, Whirlpool Corporation 83
The operational sequence of drawing, perforating, and annealing enameling steel into automatic washing machine baskets as performed on a production line at Whirlpool is described by Mr. Bauer.

STAMPINGS. "Workpiece Simplification by Stamping" 81
Three case histories are given to illustrate the techniques used to convert certain components from their former methods of manufacture into stamped workpieces. A brief description of the press and die equipment used is also given.

MACHINE TOOLS. "The New Era in Machine Tool Technology" by William C. Newberg, Dodge Div., Chrysler Corp 22
Mr. Newberg reviews the progress made by the machine tool industry during the last few years and in particular makes reference to the part automation has played in the production field.

PRESSES AND DIES. "Small Firms Compete Successfully by Using Ingenious Automatic Equipment" by William W. Schug, The V & O Press Co. 79
A report on how aggressiveness and ingenuity can pay off for small manufacturing firms. Two case histories illustrate smart press tooling which more than tripled former production.

STAINLESS STEEL. "Press Operations on Stainless Steel" by Richard E. Paret, American Iron and Steel Institute. 75
"Fabricating stainless steels is different—not difficult. Any metal has special rules for fabrication; stainless steels are no exception." With this comment, Mr. Paret proceeds to give some of the rules for fabricating the different types of stainless steel.

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A well organized tool salvage department can be profitable for both small and large industrial plants. Mr. Ash suggests procedures in establishing a salvage program and shows where the line should be drawn between profitable and unprofitable tool repair.

SPRINGS. "Handling Spring-Back in High Carbon Steel" by J. P. Malloy, The Reliable Spring & Wire Forms Co. 89

Spring-back, or the tendency of a material to return to its original state or shape, is always present in the spring industry. Since little can be done to correct it, Mr. Malloy tells how his company controls it and uses it to advantage in their manufacturing operations.

HYDRAULIC PRESSES. "Light Hydraulic Presses for Precision Assembly Jobs" 87

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• accuracy
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Another Harig Carbide die designed to out perform a comparable steel die ten to one.
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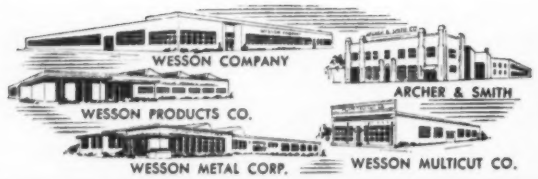


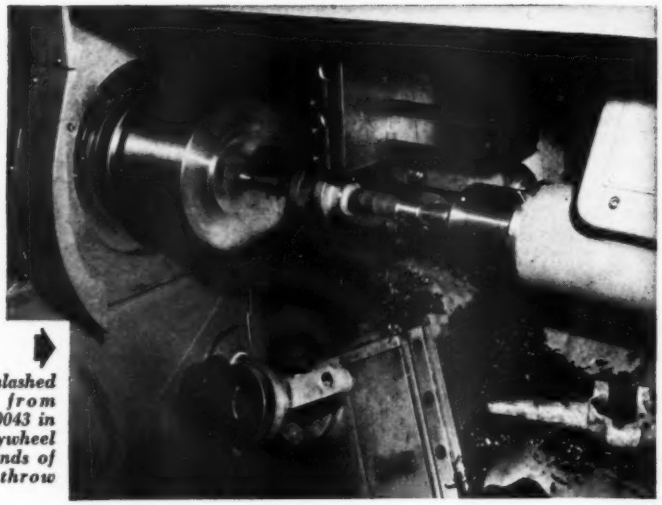
carbide NEWS

Grade 26 Cuts Tool Costs 88%

New wide range grade and holder boost pieces/grind from 85 to 800

A reduction from approximately four cents to less than ½ cent per piece in tool cost has been achieved in the machining of single-throw Arma Steel crankshafts by a midwestern machine company. These savings were obtained despite an increase in blade cost of 41% over the style previously used.

The savings were achieved in two steps. The first revealed that Wessonmetal Grade 26 would out-perform all other grades by an average of 50 pieces per cutting edge. The next step was to adopt a Wesson Multicut holder. This helped to increase tool life to 200 pieces per cutting edge. With four edges per insert, life is 800 pieces per grind, as against the original 85. Part of the overall increase is due of course to the rigid construction and support provided by the new holders.



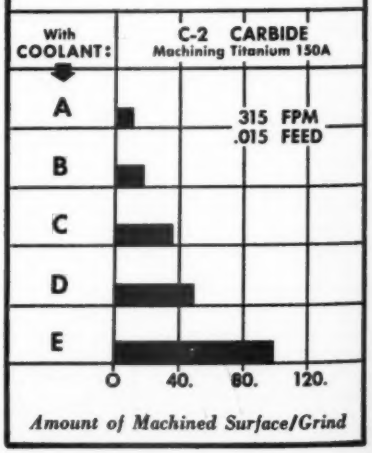
26 Carbide slashed tool cost from $0.038 to $0.0043 in machining flywheel and pulley ends of this single throw crankshaft.

Operations consist of rough and finish turning of the flywheel and pulley ends of the 220 Brinell steel crankshaft. Machining is being done dry on a 20 hp New Britain tracer lathe at 1210 rpm and .014" feed. Depth of cut averages ¼ to ⅜-inch.

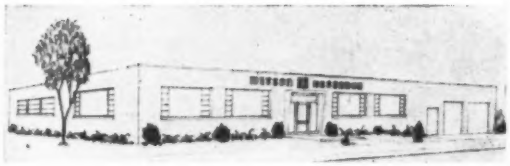
In achieving the savings, no changes were made in speeds, feeds or depths of cut.

Tool Hints...

The cost-cutting story told above re-emphasizes the necessity of studying ALL the factors contributing to tool performance if maximum economies are to be obtained. In this case, the answers lay in (a) the carbide metal and (b) the tool holder. Sometimes it may be the coolant which will provide a major saving. In the chart below, for instance, are shown relative lives of the same tool material at the same speeds and feeds using five different types of coolant in the machining of Titanium 150A! A C-2 grade of carbide was used and feed was .015" at 315 ft. per minute.



New Carbide Research Center



New concepts in carbide boring and milling cutter designs may result from new research programs now under way at Wesson. Included are milling cutters utilizing "throwaway" carbide blades.

To house Wesson's expanded product development and tool application research facilities and staff, a new one-story structure has been completed adjacent to Wesson's Detroit plant.

The new research division will supplement the basic metals research carried on in Lexington, Kentucky at the new metals plant of the Wesson Metal Corporation, now producing all Wessonmetal carbides.

The new research division is under W. B. Bader, Vice President. It is being completely equipped for fabrication as well as testing of new tool designs. Lathes, milling machines, grinders, etc., are included in the equipment.

tools Wesson carbide Wessonmetal

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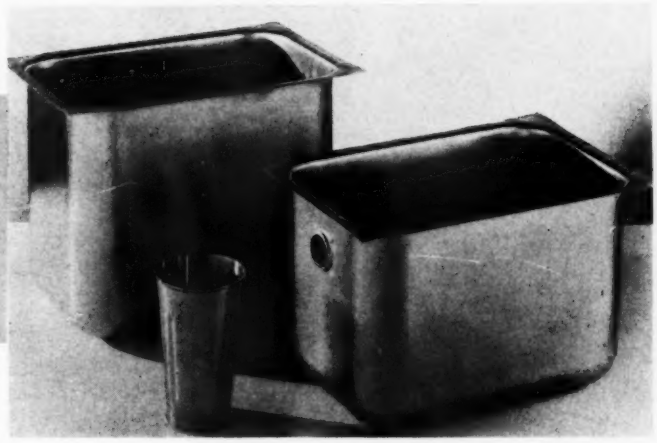
DEPT. AD
1220 Woodward Heights Blvd.
Detroit 20, Michigan



Typical deep draws that can be made in stainless steel: Sink bowls for a dish washer and a milk shake cup.

PRESS OPERATIONS ON STAINLESS STEEL

by Richard E. Paret
Stainless Steel Specialist
American Iron and Steel Institute

FABRICATING stainless steels is different not difficult. Any metal has special rules for fabrication; stainless steels are no exception.

Some manufacturers are reluctant to form stainless because their unfamiliarity with the material leads them to believe the costs may be excessive; yet stainless may actually cost less to form than mild steel. Savings are possible because of elimination of rusting problems while work is in progress and elimination of special operations designed to prevent such rust.

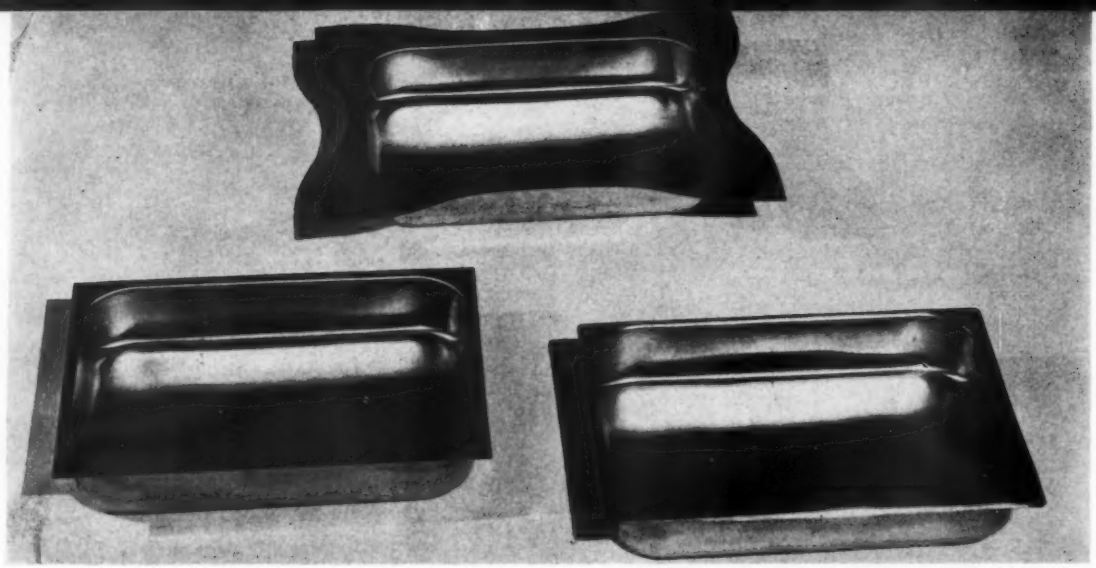
A saving may also result from the elimination of heat treating necessary with other materials to bring them up to the strengths inherently possessed by stainless. In certain cases advantage may be taken of stainless steel's high ductility to obtain greater reduction with fewer process anneals. For example, type 305 stainless has been drawn 72% in the first draw in several production pieces. Pen caps of the austenitic stainless steels are drawn well over 80% in a series of operations without annealing. Less severe draws are routine.

Stainless steels are readily available materials with high strength, high corrosion resistance and generally excellent workability. Their characteristics may require some differences between equipment used to form stainless and equipment used to form mild steel. In general, the higher strengths of the stainless steels require greater power in working operations. However, in many cases, because of the greater strength of stainless, thinner stock can be used, and the power required to work the thinner material thus reduced.

Modifications in die design may be necessary due to the work hardening of the austenitic grades. Slower press speeds are usually necessary. On the other hand, many products have been formed in stainless steel with the same equipment used to form mild steel.

Cutting

Since stainless is stronger and tougher than ordinary carbon steels, heavier tools and more rigid equipment are desirable for any type of cutting operation. From 30 to 50% greater shear capacity is usually required. Shear blades should be made from high-speed steel, ground with as great a lip clearance as possible, maintained sharp, and set close. The angle at the cutting edge must be made as small as possible without danger of chipping. The martensitic and ferritic stainless steels present no special problems; however, the



The proportions of this typical stainless steel cook's table pan suit it for production in either Type 302 or Type 430 stainless. It is made in a single draw, after which it is trimmed and the edges are rolled. Inside dimensions are 9-1/4" x 10-3/4" x 2-5/16" and stock thickness is 0.046". Bottom radius is 1/2" or, in terms of the formula, a generous 11t. Die radius is only 3/16" or 4t which makes it, perhaps, the most critical spot in the design. The flange is rolled over in a continuation of this radius after the trimming operation. Amply rounded corners are 1-7/8" or 40t in radius.

austenitic types require especially close adjustment of shear blades. Especially with the austenitic stainless steels, it is necessary to cut further through the metal, since pieces will not snap off when partially cut through as soon as will other metals.

Blanking and Punching

The higher toughness and strength of stainless requires more power and slower speeds for blanking and punching. It is normal practice to put a shear on punch or die faces to reduce the load on the equipment. It has been recommended that the shear of the die should be of a wavy or scalloped type, the distance between two scallops being not over 4" and the depth of the scallop being at least equal to the metal thickness. On an angular die the corners should be high points. The best grades of tool steels should be used. Punches and dies should be kept sharp. The austenitic stainless steels are somewhat more difficult to blank and punch than the other grades. Small clearances should be maintained to keep the metal from being drawn into the die. A general rule of thumb is to work to a clearance of 1/10 the thickness of the metal being blanked or punched.

Perforating

In perforating, from 75 to 100% more force will be required than for mild steel. Press speed should be reduced by 50 to 60%. Again, care should be taken in setting clearances for all three types of stainless — with the austenitic types requiring especially close clearances. Holes to be perforated should not be smaller in diameter than the thickness of the material being used: recommended minimum diameter is 1½ to 2 times the thickness of the material.

Lubricants are advised. And flattening or annealing operations may be required after any severe cutting operation.

If, after cutting, the edges are severely strain hardened and rough and if these edges are to be subjected to severe deformation in succeeding operations, the part should be deburred and the cold-worked metal removed. High speed grinding is particularly desirable as a deburring method, because of the localized annealing action at the edges.

Bending and Roll Forming

Stainless is often bent or formed in conventional bending brakes. Where production warrants, continuous lengths can be formed in elaborate cross sections using a progressive series of shaped forming rollers.

Bending and roll forming operations are most commonly done with the austenitic and ferritic stainless steels. They are ideally suited for these methods of cold working. These grades require approximately twice the tool capacity needed for mild steel in these operations; the martensitics are not usually formed with these techniques.

While the same methods are used for bending and roll forming stainless and mild steels, dies and forming rolls for stainless should be designed for a springback allowance of from two to three times that for mild steel. They should be kept well polished to avoid scratches and marks. Lubricants are often helpful in roll forming and die bending.

By proper design of the forming rolls, extremely sharp corners with small radii are possible. Steady, continuous forming, as in roll forming, is preferable (for the austenitics in particular) to abrupt, step-by-step forming,

as on brakes, if complex contours are being developed.

Deep Drawing

For deep drawing, all stainless steels require considerably more power and more rugged equipment than plain carbon steels of the same thickness. A speed approximately one-half that used in regular steel drawing will result in flowing stainless to a greater depth, and will reduce breakage and excessive scoring of the dies. The clearance between the punch and the draw die should be about twice that used with ordinary steel or brass.

The austenitic stainless steels are well suited for drawing operations. They have a ductility even greater than that of deep drawing carbon steel. It should be remembered, however, that these chromium-nickel types all work harden rapidly. Slower press speeds are necessary for maximum depth draws, and to achieve uniform work hardening and elongation.

The ferritic and martensitic stainless steels are less ductile than the austenitics. The ferritics can be satisfactorily deep drawn although less severe reductions per step are possible. Ductility may be improved by heating blanks in boiling water prior to drawing. The martensitics, except type 410, are drawn infrequently, and with less severe draws.

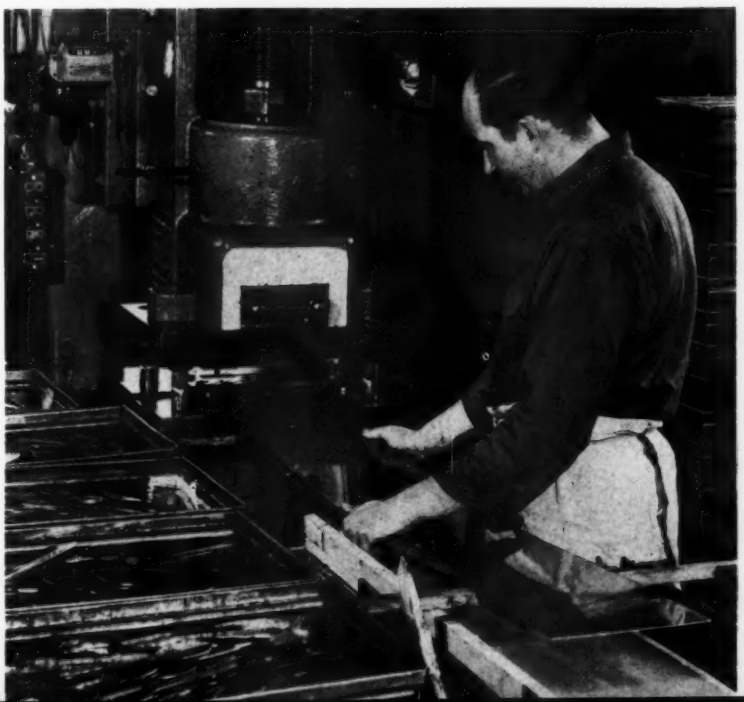
Solid dies of high-carbon, high-chromium compositions are best suited for the drawing of stainless steel sheets and strip; yet for short runs, close-grained cast iron of heat-treatable type is satisfactory. Dies should be kept smooth and polished at all times to avoid marking the parts. Hard bronze draw rings are desirable to minimize scoring.

In general, a relatively rough surface such as No. 1 or No. 2D finish is desirable for deep drawing. However, for relatively shallow draws a more polished surface can be occasionally used.

Expressed in terms of the metal thickness, the die radius, which forms the radius under the flange, should not, in general, be less than 4t for 18-8 stainless steel. Values smaller than this will decrease the reduction possible and increase the possibility of cracking. Very small radii under the flange can be obtained by an additional operation. Note that an annealing treatment is required before sizing.

On the other hand, when the die radius, and consequently the under-flange radius, exceeds 10t, wrinkling in the flange of an 18-8 part can only be avoided by applying a high hold-down force, which in turn decreases the reduction possible.

The punch radius, which forms the bottom radius of the part, should be 4t minimum for the 18-8 stainless types. For the 17% chromi-



Blanking of stainless steel spoons on a Federal 65-ton press. It is recommended that clearances be kept small—approximately 1/10 of the thickness of the metal being blanked. Note protective sheets of paper which interleave the stainless strip.

um stainless, 5t to 8t would be more desirable. Smaller bottom radii must be obtained with a secondary operation.

It is possible to obtain smoothly rounded cup bottoms by increasing punch-nose radius to 100t or more. However, this may necessitate higher hold-down forces to avoid puckering. Thus the possibility of rupturing is increased owing to the higher tensile forces imposed on the part. Difficulties with large bottom radii can be avoided with additional operations.

Corner radii of boxes should be as large as other design considerations permit. Minimum limits are about 5t for the austenitic grades and 8t to 10t for the chromium grades.

Heavy-bodied lubricants with high film strength must be used to maintain a continuous film. The choice of the proper lubricant may be sufficiently complex to warrant advice from a qualified lubricant supplier.

Heat Treating and Annealing

The Austenitic Stainless Steels: None of the austenitic stainless steels is normally hardenable by heat treatment. High strength is obtained by cold working this group. Type 301 with its lower nickel-chromium ratio is particularly suited to work hardening to high mechanical properties.

Normally, however, the austenitic stainless steels are used in the annealed condition. The metal then has the greatest resistance to corrosion, and is also very ductile and hence best suited for bending, forming, and deep drawing. Most austenitic stainless is supplied by the primary producer already annealed. If in fabrication the material is cold worked to an undesirable extent, the piece can be annealed to 1950-2050°F followed by rapid cooling.

Caution: Remove the lubricating compound before heat treatment; if it remains on the surface it may cause a serious etching attack on the metal, or carburization and subsequent potential reduction of corrosion resistance.

The Ferritic Stainless Steels: Ferritic stainless steels require moderate temperatures only for process annealing and stress relieving. Treatment on the medium chromium ferritic stainless steels differs somewhat from that of the higher chromium steels.

The type 430, with 14 to 18% chromium, and for other ferritic stainless steels of the medium-chromium type, maximum ductility is obtained by holding at 1400 to 1500°F until the metal is heated through, followed by rapid cooling. This, of course, requires that the whole piece be annealed. When this is not possible or practical, heating the work to a dull cherry red using a blowtorch, followed by rapid cooling in air, will usually be satisfactory.

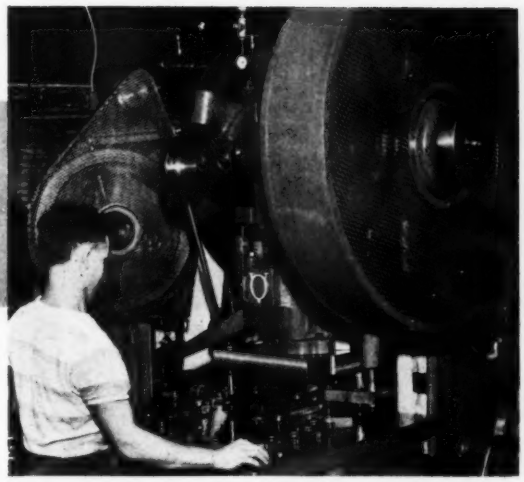
For type 446, with 23 to 27% chromium, heat the piece through at 1450 to 1600°F—then cool rapidly. Quenching is desirable.

The Martensitic Stainless Steels: The martensitic stainless steels can be heat-treated to high strength and toughness. For the highest mechanical properties, the piece should be heated to 1800 to 1850°F and quenched in oil. Because of the low thermal conductivity, it should be heated slowly and carefully to the proper temperature. Where oil quenching may cause cracking because of intricate or complicated design, air cooling may be used. Hardening must always be followed by stress relieving or tempering at 400°F or higher, depending on the desired properties.

In working the martensitic stainless steels, some method of relieving stresses and increasing the ductility and toughness may be desired. The work should be annealed in a muffle-type furnace, since direct contact with a flame for any length of time is undesirable. Heat the piece uniformly and slowly to 1400 to 1500°F and soak thoroughly. Furnace cooling to 1100°F is recommended. If air-cooled, do not heat the piece above 1400°F.

HEAT TREATING AND ANNEALING

	Hardening	Full Anneal	Process Anneal
Austenitics Unstabilized	Hardenable only through cold working	1850° - 2100°F quick cool	1800° - 2050°F quick cool
Stabilized	Hardenable only through cold working	1850° - 2050° F air cool	1550° - 1650°F. air cool
Ferritics	Non-Hardenable	1450° - 1550°F air cool	1200° - 1525°F air cool
Martensitics	1750° - 1950°F oil or air quench	1500° - 1650°F slow cool	1300° - 1400°F air cool



A combination of good operators and modern equipment, such as this specially engineered Model 50S V & O press, has given Omega Ball Bearing Co. what they believe to be the most productive force of its size in the industry.

Small Firms Compete Successfully By Using INGENIOUS AUTOMATIC EQUIPMENT

by William W. Schug
THE V & O PRESS CO.
Division Emhart Mfg. Co.
Hudson, N. Y.

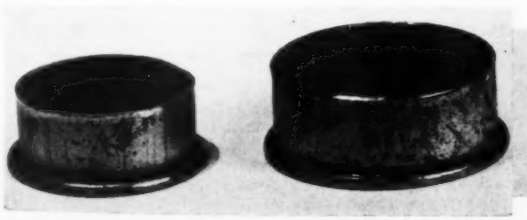
THE HIGHER PRODUCTIVITY of automatic machinery that can perform more than one operation is helping to keep many small but aggressive manufacturing firms in the thick of the competitive struggle for markets.

Typical of these firms is the Omega Ball Bearing Co., Poughkeepsie, N. Y. With modern machinery and production techniques, the company's 40-man working force has achieved what is said to be the highest productivity rate of any group its size in the industry.

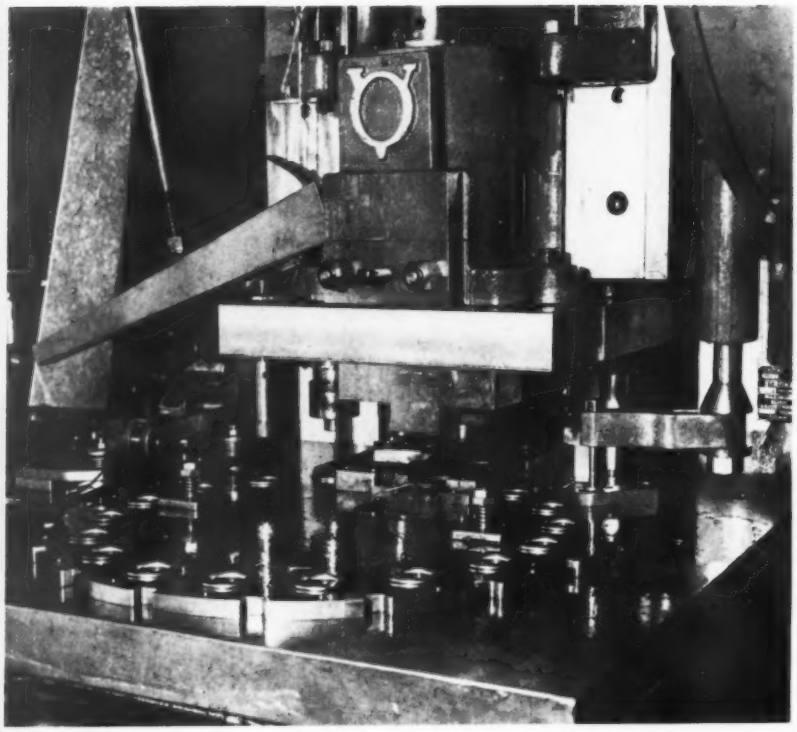
Omega tripled production of outer housings for 1⅛" and 1⅜" ball bearings, most popular sizes in its line, with the installation of a specially tooled 50-ton press. Equipped with an 18-station dial feed and a 5-station Hampden steel progressive die, the press turns out 60 to 70 complete outer housings per minute as compared to 20 turned out by conventional methods.

The press is fed 10-10 dead soft commercial steel, 0.032" thick for the smaller size housing and 0.038" for the larger. The material is automatically blanked, drawn, pierced, flanged, and ejected as it moves across the progressive die and through the dial. Average production run on the 1⅛" size is about 4,000,000 and about half that on the larger size.

Corollary benefits that have contributed to overall productivity include virtually complete elimination of rejects and the removal of a tool breakage problem. At the same time, product quality has been improved generally. The press as tooled has eliminated burring, and



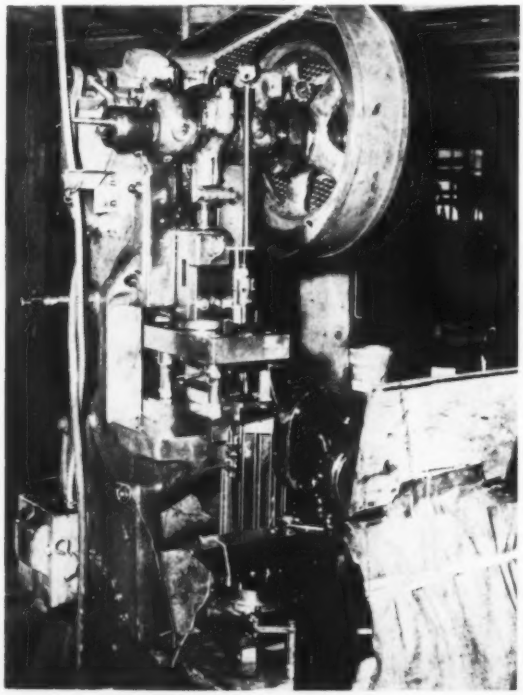
Omega Ball Bearing Co. produces these outer housings for their 1⅛" and 1⅜" ball bearings on a V & O press.



Close-up of the press tooling shows 18-station dial feed and 5-station Hampden steel progressive die used to produce bearing outer housings.

serves as an inspection device on the dimensional uniformity of stock in use, since it will not operate with out-of-tolerance material.

Tripling the output of 14 presses with two specially-tooled V & O presses, Master Rule Mfg. Co., Middletown, N. Y., is another company that has benefited from automatic equipment. The company manufactures wooden folding rules.



Master Rule produces the springs on this Number O V & O press, using an 8-station progressive die. Pick-up rods are fitted into the turntable (lower center). As each rod picks up its complement of springs, the stacking mechanism automatically indexes to present a new rod at the transfer point.

The vital part of the rule is the metal clamp that acts as a joint at each section. It consists of a stainless steel spring, two clamp halves (male and female), and an eyelet which serves as the fastener.

A Model 50S press, equipped with a dial feed and two progressive dies, now makes the clamp halves, feeds the springs and eyelets, and automatically assembles and ejects the completed part. The only manual operation required is placing the springs in the magazine on the dial feed. The springs are made on the second press, which is equipped with an 8-station progressive die. Together, the two presses turn out 20,000 completed clamps in an average 7½-hr day.

Formerly, 13 presses, each manned by an operator, were required to fabricate and assemble the clamps, while another press made the springs. Even with extensive overtime, 6000 completed clamp assemblies were maximum daily output with this single-operation production method.

. . . Continued on page 100

WORKPIECE SIMPLIFICATION BY STAMPING

THE PRODUCER of metal end products and their components is constantly under pressure to hold his business through the method by which he fabricates his products, whether it be forging, casting, screw machine or stamping, because his customer's major consideration is the product's cost per unit.

Since this unit cost revolves around the number of parts that can be produced per hour, it is not unusual for the user to scrutinize the different methods available for producing his product.

For this reason we frequently find the manufacture of a product changed from one method to another when a lower cost per unit can be obtained by such a change.

Several examples of converting from one method of manufacture to another are illustrated in that of an automobile sun visor bracket and two parts used in automatic control equipment that have been converted to stampings by the Advance Stamping Company of Detroit.

The automobile sun visor bracket, Figure 1, was formerly produced as a casting, but the manufacturing method has been converted to stamping for the reason that it can be stamped considerably cheaper.

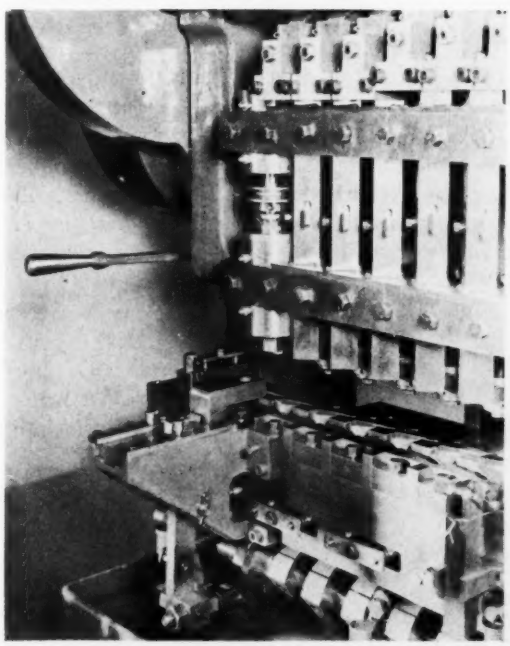
Advance Stamping uses a Waterbury Farrel No. 200 9-station crank eyelet machine on this job. The material is strip steel stock which is fed into the first station located on the right side of the press where the part is blanked out. The blank is then automatically transferred progressively from right to left to the succeeding stations in which additional draws and forming take place. The rate of production is approximately 1500 pcs/hr.

An eyelet machine can be thought of as a series of punch presses contained in one frame wherein individual punches and dies are provided for each ram or plunger. However, it is an automatic multiple plunger power press built with from 6 to 12 plungers. There are two modes of actuating the plungers, that is, by an individual cam for each plunger, or by the plungers being connected directly to the press crank. The cam operated type is usually used on light gauge metal while the crank type is used on heavier gauge steel. Figure 2 shows the plunger arrangement and the finger mechanism of a Waterbury Farrel eyelet machine.

Thus, in tooling up a 9-plunger machine there will be as many as 9 individual punches and dies, the first set on the right being a blanking punch and die. Each of the remaining eight dies will progressively impart a change in shape to the part until it is a completed workpiece when ejected from the 9th station.

The strip scrap does not travel with the part as in a progressive die, but continues separately through the machine as the part is blanked at the first station. From the first station the blank is automatically transferred to the successive stations by means of a transfer slide and a pick-up finger mechanism.

Fig. 2. This illustration of a Waterbury Farrel eyelet machine shows the spring loaded finger mechanisms mounted on a cam operated transfer slide. The finger mechanisms are located between die stations and each one oscillates between two stations, thereby picking up a part from a station on the right and transferring it to the station on the left.



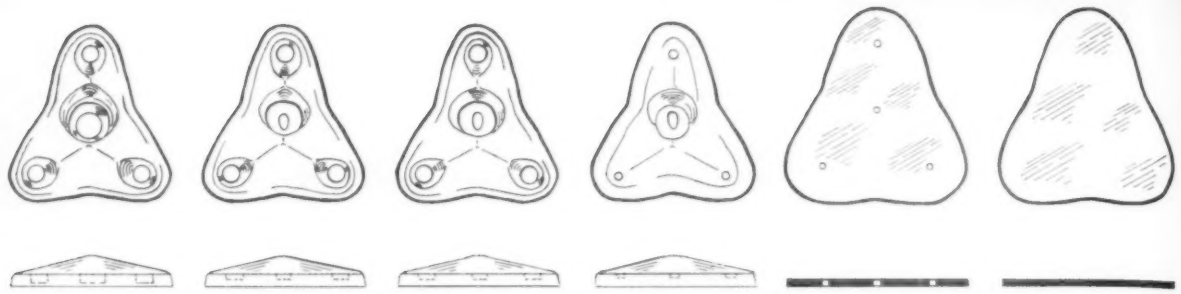


Fig. 1. This automobile sun visor bracket was formerly produced as a casting but the method of manufacturing has been converted to stamping. It is produced on a Waterbury Farrel eyelet machine in which the first station for blanking is located at the right side of the machine. The part is automatically transferred from right to left for the successive draws.

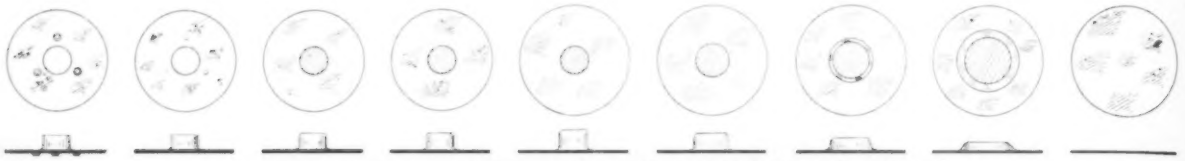


Fig. 3. This part was formerly made up of a stamped ring and a piece of tubing and assembled by welding or brazing. It is a component used in automatic control equipment and is now produced by stamping on a crank eyelet machine.

Two spring loaded fingers, designed to fit the workpiece, are provided for each station. These fingers are carried in the transfer slide which is actuated by a cam driven from the press crank.

The finger mechanisms are so arranged that they oscillate between two stations, thereby picking up a part from a station on the right and transferring it to the station on the left. Inasmuch as the finger mechanisms are carried on the transfer slide and this slide is cam operated, the cam then imparts the proper back and forth movement to the transfer slide so that the fingers return to the station on the right, ready to pick up another part to be transferred.

Knockout pins are provided for lifting the part out of the dies so that the fingers can grasp the part.

The part shown in Figure 3 is a component used in automatic control equipment produced for the General Controls Corporation. This part was originally made up of two pieces, a stamped ring and a piece of tubing which were assembled by welding or brazing.

As it is now formed, the first blank is 3" in dia. Each successive draw reduces this diameter until the final piece is 2¾". At the eighth station the top of the draw is punched out and three small holes punched. In the last station these holes are enlarged by countersinking punches thus forcing some metal through to the underside.

It is drawn on the same type of Waterbury Farrel eyelet machine as used in producing the sun visor bracket at a production rate of 1500 pcs/hr.

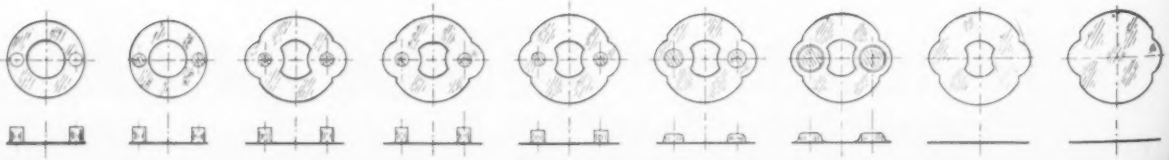
Another piece used in automatic control equipment by the General Controls Corporation is shown in Figure 4. This piece is made of copper and was formerly fabricated from a stamped ring and two pieces of tubing assembled by welding or brazing.

This piece is now run on a Waterbury Farrel eyelet machine, a model No. 12, 10-station cam machine; however only 9 stations are used on this job.

The diameter of the piece blanked in the first station is 1¾". The successive drawings reduce this diameter to 1$^{5}/_{16}$" in the finished piece. The piece is trimmed and punched at the eighth station to remove the excess metal and thus form a circular disc with a round hole in the center. The tops of the two drawn tubes are punched out in the last station. Production rate on this job is 2500 pcs/hr.

For clarity in illustrating these stampings, shading and cross hatch lines have been used to indicate solid metal, thus holes and openings appear clear.

Fig. 4. Another component used in automatic control equipment is shown which was formerly made by welding two pieces of tubing to a stamped ring. It has been converted to a stamping produced on a cam operated eyelet machine.



Press And Spinning Roll Operations

TEAM UP FOR GREATER EFFICIENCY

After successive draw, restrike and piercing operations on washing machine baskets, a band at the top is induction heated for annealing. Spinning rolls then turn the top edge inward and downward. Side and top holes are pierced subsequently in indexing setups.

by John H. Bauer
Manufacturing Engineer
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Clyde, Ohio

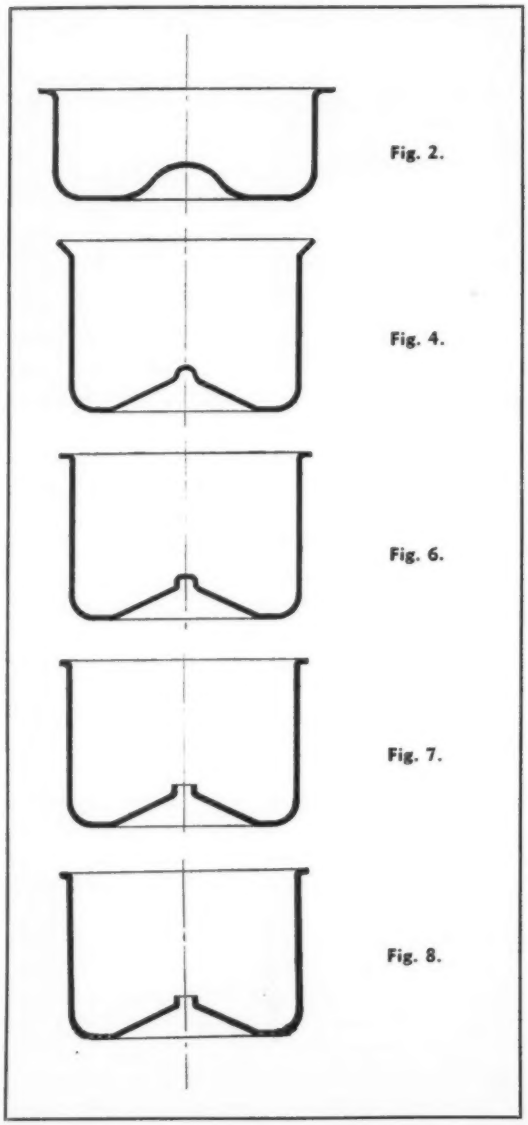
AUTOMATIC WASHING MACHINES for home laundries are manufactured on an efficient, production basis by the Clyde Division of Whirlpool Corporation. Each machine requires a sheet steel basket designed to rotate within a tub during the water extraction portions of the washing cycles, water passing out through holes in the side walls and bottom of the basket.

Numerous operations enter into production of the basket but they are well organized and proceed on a highly efficient basis. They start with 42″ circular blanks of 18-ga (0.0478″) enameling steel, delivered in stacks to the 850-ton, double-acting Clearing press, Figure 1. Just before the press closes, six DeVilbiss spray guns, controlled by a trip switch operated by the press and in use during only a small portion of the stroke, apply Pillsbury No. 636 compound to both faces of the hand-loaded blank.

This yields a drawn part, 25″ in diameter and 12½″ deep, having a reverse draw in the bottom and the cross-section shown in Figure 2. After the blankholder clears the workpiece by 2″ on the upstroke, pins actuated by an air cushion in the bed of the press eject the part from the die, and it is then lifted out by hand. Output ranges about 220-230 pcs/hr, with one man at each side of the press.

Fig. 1. Die and press used for the first draw of the 42″ circular blank. Just before the die closes, six timed spray guns apply Pillsbury draw compound to the top of the blank. An air cushion operates knockout pins.

A duplicate press makes the second draw, Figure 3, resulting in a piece of 21″ dia and 16″ deep, Figure 4, and is again ejected by an air cushion. The bottom shape is altered and the flange is given a 45° angle in this operation.



Figs. 2, 4, 6, 7, 8. Successive press operations in the production of Whirlpool washing machine baskets.

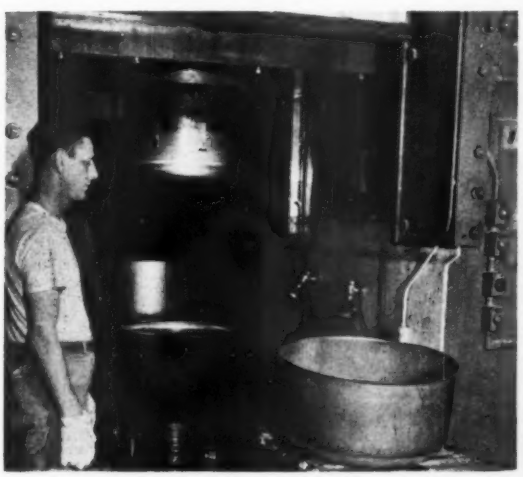
Fig. 3. In this press, the second draw is made, reducing diameter, increasing height, reforming the bottom and turning the flange upward to a 45° angle.

There are three dies set up in the third Clearing press of 4850-ton capacity, Figure 5, and three men are required to load and unload the parts in the successive dies. A basket comes to the rear of this press on a roller conveyor and is located first under the punch at the rear-center of the press where the bottom is restruck and the flange is left square, Figure 6. It is then ejected by an air cushion. Then it is transferred to the second die, located at the right, for trimming the flange to 5/16″ width, and also piercing the center hole in the bottom, Figure 7. Finally it is transferred to the third die, at the left, where 288 holes of 3/16″ dia are pierced in the bottom, Figure 8.

Transferring the parts between the three presses is performed by short gravity roller conveyors, but after the baskets come from the third press they are hung on an overhead chain conveyor that carries them through a washing machine and then to the line described below. All three presses operate at approximately the same rate, which is about the same as that attained on the next line. A large storage space is provided at a high level, just under the roof, where there is space for 5000 baskets. They remain on conveyor hooks but are shunted off of and back to the main chain, as required, for porcelain enameling.

On this second line, severe forming at the top of the basket is needed and, since considerable work hardening has occurred in the prior press operations, the upper band of each basket has to be annealed. This is done in the 2-station Weltronic induction machine, Figure 9, having two 50-kva heating units that are loaded and unloaded alternately by one man.

As soon as a basket is set above a heating unit, the operator presses a button starting an automatic cycle that includes (1) lowering the basket to heating position with the top 3″ band inside the coil, heating for 17-22 sec over this



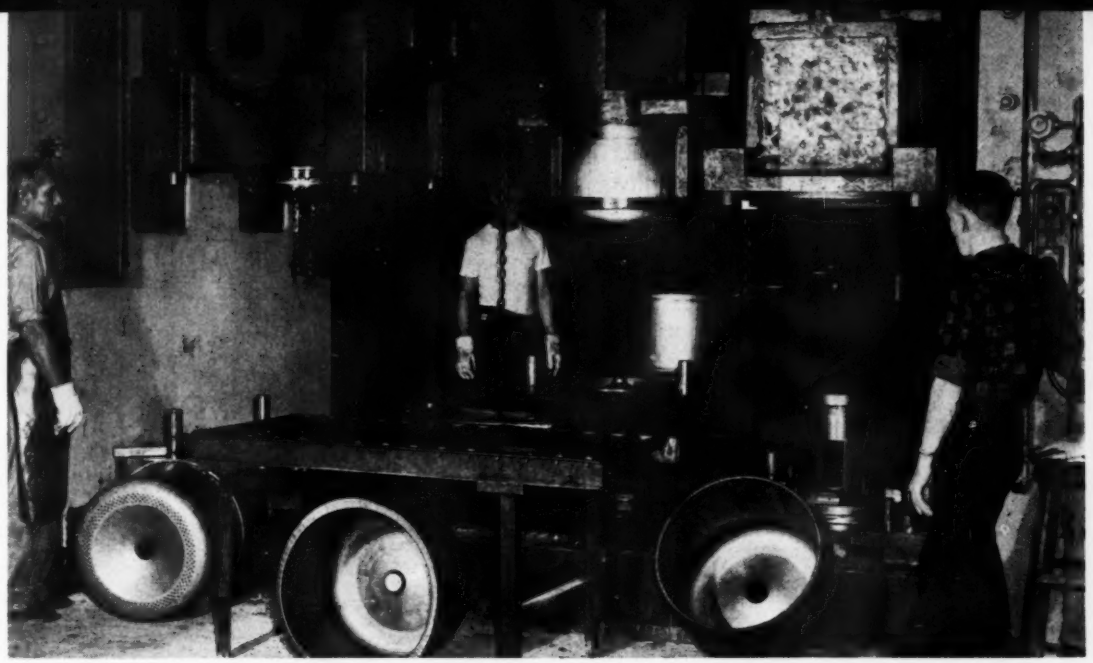


Fig. 5. Press holding three dies that, in succession (1) restrike the bottom and flatten the flange; (2) pierce the central hole and trim the flange; and (3) pierce small holes in the bottom. There is one operator for each die and all three must press buttons simultaneously to close the press.

band, and (2) automatic elevation after current is shut off. As these occur, the operator unloads and reloads at the other station.

Baskets thus heated are passed to the Yoder spinning rolls, Figure 10, where, with the workpiece set in a rotating fixture, the rolls spin the upper portion of the basket inward, forming a large radius. This is followed by trimming in the Whiting rotary machine, Figure 11, that cuts off the neck formed in the prior operation and leaves an inturned flange.

Next, the baskets go to another Yoder machine, the rolls of which turn the flange downward toward the bottom of the basket. Still another Yoder machine then makes a return bend along the edge of the flange, producing a bead. This completes the forming of the basket, but the piercing of holes in the top and side walls still remains to be done.

Top holes are pierced on a Verson press equipped with an indexing setup, Figure 12. Cam-actuated punches operate from the inside outward to produce, through eight indexes, a total of 48 3/16″ holes. In this setup the basket is held with its axis horizontal and is air clamped between indexings.

Fig. 9. Two-section electronic setup having two induction coils that, after the basket is lowered, heat 3″ bands to anneal the work hardened metal and thus facilitate the spinning operations that follow the annealing.

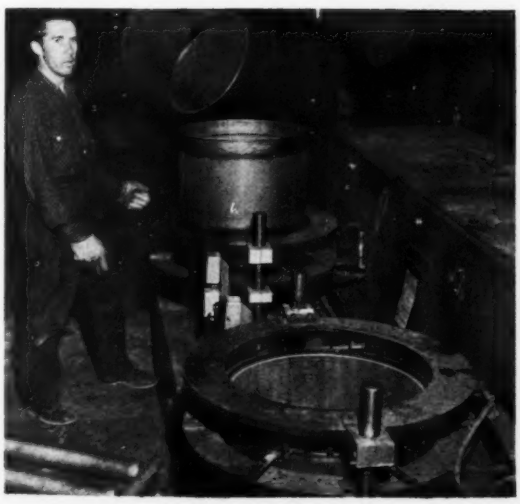


Fig. 10. Removing a basket from a Yoder machine where rolls spin the top of the basket inward, producing a large radius.

Fig. 11. Using a rotary cutter to remove metal from the neck formed at the top in the prior spinning operation. Subsequent spinning makes a return bend at the edge.

Fig. 12. Setup for horizontal piercing of holes in the top of the basket using cam operated punches that move from the inside outward as the press, at left, is closed. Indexing is done between the piercing of each set of eight holes.

Side wall holes, also, are pierced outward so that any burrs formed by the punches will be on the outside of the basket. Consequently, a special indexing setup in a Verson press, Figure 13, equipped with a cam-operated die is employed. In this setup, the basket is first set over the indexing fixture and is air clamped by a vertical ram. Thereupon, the 39 punches on the cam slide are advanced, pierce 39 holes, and push the slugs through the die which has its vertical front face curved to fit the basket OD. When the punches retract, the basket is indexed automatically and the next group of holes is pierced. There are a total of 22 piercing strokes per basket; and, when the 22 indexings are completed, the press stops, the basket is unclamped and removed and a new one is loaded. This piercing operation produces 858 holes in the side walls of the basket.

As piercing throws burrs outward they must be removed, not only to make the workpiece smooth for safety reasons but to facilitate and insure good vitreous enameling. The special brushing setup shown in Figure 14 is used for this deburring operation. It includes three cupped Osborn wire brushes, one brush at each side of the basket but at different heights, and one brush below for brushing the bottom holes. Above the basket is a sanding disc set at an inclined angle to remove the burrs at holes in the top of the basket.

All four of these units are power driven, as is the spinner that rotates the basket. Neither the brushes nor the disc touch the basket until after it is loaded, but all are fed into the basket surface as soon as the basket is loaded. This operation completes those performed on this line and leaves the baskets ready for enameling after they have been washed. Average output of the line approximates 190 baskets an hour.

Fig. 13. Verson press setup in which holes are pierced by punches moving from the inside outward. Slugs fall through the die whose curved vertical face can be seen. Punches are cam operated and make 39 holes per indexing.

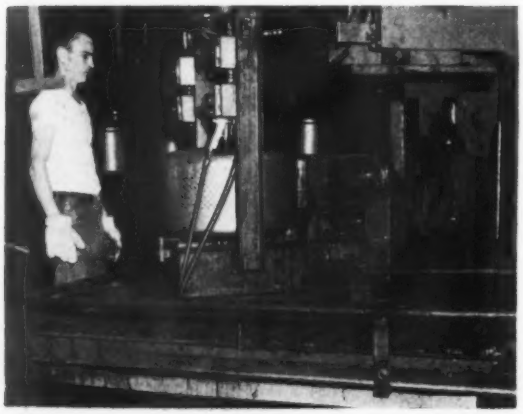


Fig. 14. After basket rotation starts, three wire brushes and an abrasive disc are pressed against outer surfaces to remove burrs where holes have been pierced.

LIGHT HYDRAULIC PRESSES FOR PRECISION ASSEMBLY JOBS . . .

—are effectively applied in new plant equipped to build automatic transmissions. Controls are convenient and permit use of desired pressure and rate of motion without shock.

SEVERAL ASSEMBLY JOBS are done rapidly and under precise control by use of small hydraulic presses in the new Decatur, Illinois, plant of the Marvel-Schebler Products Division, Borg-Warner Corporation. These presses, chosen because they do the jobs rapidly under controlled pressure and speed, are easily set to meet the exacting conditions on products requiring precision and high quality.

All equipment in this plant is new, but its choice was dictated largely by long experience in doing successfully identical or parallel jobs in the corporation's transmission plant in Muncie, Indiana.

Fairly conventional, yet needing care, is the insertion of bushings in reverse sun gears in the press setup shown in Figure 1. Each bushing is slipped over the punch by hand and rests against a shoulder that later applies insertion pressure. The gear is centered in a simple fixture on the bed. To close the press, the operator presses one control button with each hand, assuring that both hands are in safe position. At the end of the stroke, a second step on the punch contacts the gear face and insures that the end of the bushing is pressed ⅛" below the face. Bushings thus inserted are then bored in another machine by the same man who operates the insertion press.

Assembly of planet carriers, Figure 2, is done in a 35-ton press, using a precision fixture that locates the assembly both for height and angular position. When so located, the six planet pivot pins to be pressed home are in line with two sets of six punches each. One set is below the assembly in the lower half of the assembly fixture. Above and actuated by the ram is a second set.

To close the press, the operator moves two levers, one with each hand. This causes the press to force the eight pins down until, at about 90% of stroke, staking points above and below each pin start to force themselves into pin ends. At completion of the stroke, the

Fig. 1. One of several Denison hydraulic presses employed in Marvel-Schebler Products Div., Borg-Warner Corp. for assembly operations. This press inserts bushings into a reverse sun gear held in a fixture on the press bed.

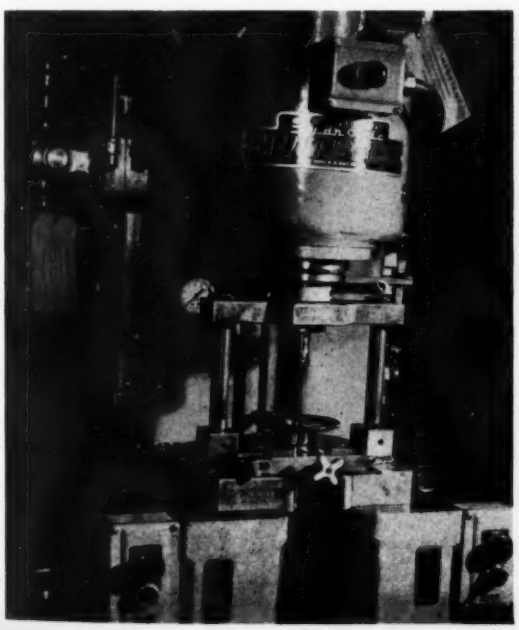


Fig. 2. In this 35-ton Multipress, pivot pins are pressed into a planet carrier for an automatic transmission and, at the end of the stroke, are staked at both ends.

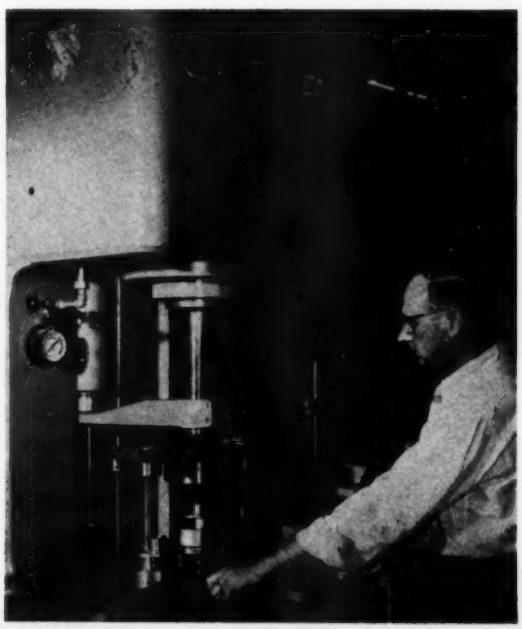


Fig. 3. These two light hydraulic presses assemble bushings into a planet carried for a Fordomatic transmission in two rapid, successive operations.

pins are in flush position with both ends staked fast. This does not require full press capacity and only enough pressure is applied to accomplish the desired result quickly and without shock.

On the way to the press the carrier components are put into place by girls who load the pinions, needle bearings and pins into the carrier cage in correct order. The press operator then places the assembly in the press, closes and opens the latter and removes the completed assembly. This he places on an inclined track for advance toward the main transmission assembly line.

Before the plant carrier cages reach the point where planet gears and pins are put into place, however, the cages undergo other assembly operations that involve the use of three Denison presses as shown in Figures 3 and 4. Presses appearing in Figure 3 are used for inserting bushings that are in line with the main axis of the cage. In the press at the right, a bushing is placed over a hollow shoulder punch and is pressed over a tubular extension, while the cage is centered over the fixture below. Then the carrier is transferred to the press at the left and a smaller bushing is placed over a shoulder punch, the carrier again being centered below the punch whose end pilots in a hole in the lower fixture as the bushing is pushed home.

Prior to the bushing assembly operation the carrier was processed in the 35-ton press of Figure 4. There, the carrier is inverted and placed in the lower half of the fixture where the planet cover is fastened to the carrier with three rivets. These rivets are headed simultaneously.

Here, also, there are dual controls so that the operator must have his hands in safe position when the press is closing.

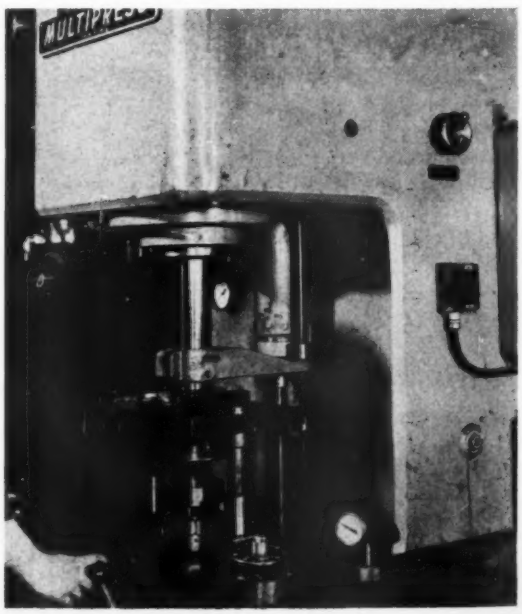


Fig. 4. In this 35-ton press, identical with that shown in Figure 2, three rivets are pressed into position and are headed to fasten the planet cover to the carrier.

HERE'S HOW ONE MAN'S "HEADACHE" CAN BE ANOTHER MAN'S "ASPIRIN". FURTHER, MR. MALLOY DISCLOSES THAT THE SPRING MANUFACTURING INDUSTRY REPRESENTS A MARKET FOR THE SPECIALIZED SKILLS OF THE TOOL AND DIE SHOP.

HANDLING SPRING-BACK IN HIGH CARBON STEEL

by J. P. Malloy
Chief Engineer
RELIABLE SPRING & WIRE FORMS CO.
Cleveland, Ohio

A GROUP OF MEN prominent in the stamping industry were engaged in an informal discussion and exchange of ideas on correcting or handling spring-back in stampings. After some time, one of the gentlemen asked to be excused. When queried as to his early departure, he said he not only had all of their problems but a few of his own with high carbon steel.

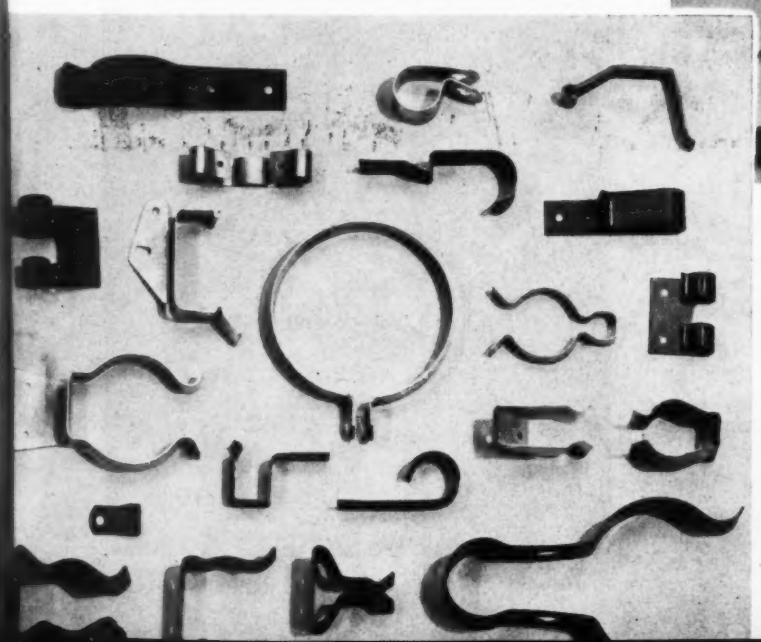
The spring-back question has been posed to the writer many times by users of both large and small quantities of spring stampings. The nature of these questions leads the writer to appreciate that you are not constantly plagued with the evil but on certain occasions it is more or less pronounced.

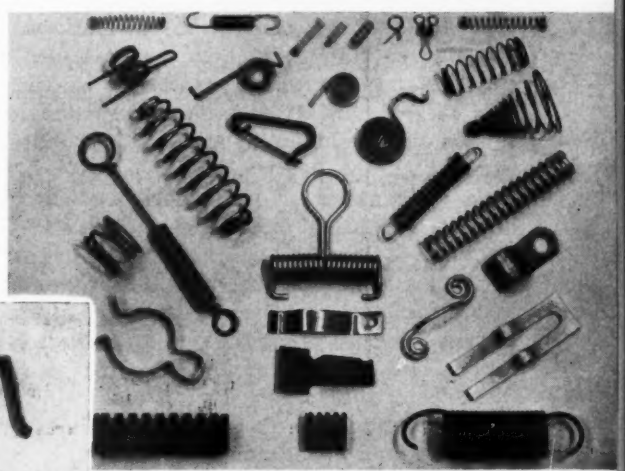
Spring-back, or the tendency of a material to return after deformation to its original state or shape, is always present, more or less, depending on the material or the manufacturing operation. In the spring industry we are always faced with it. And what do we do about correcting it? Very little; what we actually try to do is to control it and use it to our advantage in our manufacturing operations.

Control of spring-back is exercised throughout three stages of manufacture, i.e.:

1. Choice of material;
2. Tooling design and manufacturing methods; and
3. Process finishing or heat treatment.

Let's analyze an average case as it arises in the spring industry. We plan to produce a helical spring from high carbon steel wire. Whether we plan on a manual operation or set up an automatic machine, you can be certain





All of these formed spring-shapes start out as high carbon steel flat stampings. The spring manufacturer designs his forming tools to take advantage of spring-back so that after spring-back the shape of the piece meets specifications. Uniformity of metallurgical analysis as well as uniform accuracy in the dimensions of the flat blanks are essential for a run in order that spring-back shall be uniform. In the case of springs made from round wire, the calculated and controlled spring-back expedites ejecting or unloading them from the winding mandrels.

The optical comparator is a fast working tool fc checking the finished shape (after spring-back) of a high carbon steel wire form.

we will prefer to use pre-tempered spring material, meaning material which has been cold worked to a very high tensile value. We use the controlled spring-back in the manual operation in order to remove the finished helix from the mandrel; and in the automatic machine we need the hard, high tensile material to withstand the feed roll pressure as we force the wire through the guides and into the groove of a coiling point and over a mandrel or arbor.

To compensate for spring-back we use an arbor or mandrel of a diameter which is smaller by a predetermined value obtained from experience tables. Then the part is heat treated to become stress relieved or stabilized. This process not only raises the elastic stress limitations but increases or decreases the actual diameter of the spring. This is one example of coordinating choice of material, tooling and processing to control high carbon spring-back.

All springs made are not helical. In fact, a sizeable percentage of all spring products is of flat or round wire forms. This classification includes spring stampings. When we think of stampings, press production equipment is indicated; and, the versatility and production speeds of the present day stamping press is indeed amazing. We would prefer to manufacture all our flat production on press equipment were it not for the spring-back factor.

Where the studied design of the furnished part permits the use of pre-tempered spring steel, and the nature of the formation requires no special press tooling, we will manufacture the required component from material whose specific range of hardness will permit further heat treat to control the element of spring-back. Where very pronounced forming or bending either with or against the direction of rolling is required and where no special corrective press tooling is necessary such as camming to insure over-bending, we use annealed, high carbon steel and then heat treat to attain the specific physical properties.

When we are confronted with a situation which requires corrective camming or the provision for additional motion within the tooling in order to produce a given part, we relegate production of this nature to multiple slide forming machines. These have all the necessary motion built into the equipment so that adjustable tooling can be installed. Further, we utilize the predetermined spring-back to help strip and eject the formed pieces from the operating tool area. Additionally, the press work attachment feature of this type machine permits our purchase of the necessary die section or sections and accelerates our production schedules by releasing our own tooling personnel to carry on with their specialty of finish forming a predetermined blank into the correct configurations.

Production from the automatic spring coiling machines is subject to continuing inspection. These machines straighten the wire, wind it, and cut off, accurately and at high rates.

In the majority of cases the material utilized in this type of production would be annealed high carbon steel, cold finished to prescribed surface hardness. The part is then heat treated to the physical properties required. This is again another example of utilizing good material, correct tooling, and heat treat processing to control spring-back in high carbon steel.

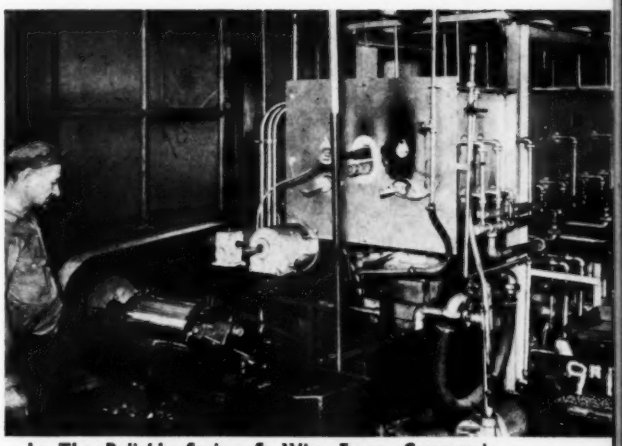
Reliable Spring Company has long employed every possible means to accelerate production schedules. To this end we are immeasurably assisted by being able to secure the press tools required for the multiple slide machines from outside sources. With millions of dollars worth of the finest tool and die making equipment advantageously located in the vicinity, it is basic economics to call upon this vast pool of skilled personnel and equipment to construct that portion of the tooling they are best fitted to produce.

Our requirements from the outside tool sources are simply for a predetermined blank, and with the tools so mounted that the blank will be correctly positioned in our equipment for further forming. They are not burdened with any problems of over-bending or spring-back and to date the arrangement has been highly satisfactory. Very often production recommendations as a result of consultations with the tool and die industry on the construction of the press tools have saved us considerable forming tool time.

Over the years we have received numerous inquiries on our standard methods for the heat treatment of high carbon spring steel. When we use annealed spring steel, we follow the customary procedure of hardening and tempering to obtain the final hardness which will give the maximum quality and service. We use the latest facilities and accessories to insure scale free bright hard and clean parts, since many of our production parts require additional finishing such as plating or painting.

In answer to inquiries as to our processing of pre-tempered high carbon spring steel or other alloys such as the hard stainless steels or copper base alloys which are used for spring stamping applications, we try to follow a set pattern of procedure based on experience tables.

Whether helical springs or pre-tempered flat spring stampings are involved, the extent of the cold work deformation serves as a guide to the material's reaction to heat treatment. In no case is the time-temperature relationship permitted to effect any change in the physical hardness. We charge the batch into air draw furnaces equipped with dual controls, one thermocouple indicating furnace temperatures and the other buried midway in the charge and connected to an indicating recording instrument.



In The Reliable Spring & Wire Forms Company's operations, heat treating is one of the most critical. Because the product has to be handled in such a "loose bulk" manner, the weight of charge and time at temperature has to be prescribed accurately for the varieties of materials encountered. The air draw furnaces are of the dual control type; one thermocouple indicates the furnace temperature, another, buried midway in the charge, gives the batch temperature. Shown here is the discharge end of one of their hardening furnaces.

From previous curves we have established a very close relationship of charge weight and time at temperature.

For the various high carbon steel products subject to stress relief our temperature range is 400 to 750°F. Time at temperature can vary from 40 minutes to 1½ hours.

Our handling of stainless steel is similar, with a slightly higher temperature range and a shorter time cycle. However, a word of caution. When subject to heat treatment stainless steel responds opposite to carbon steels. Whereas carbon steel stampings are prone to relax to smaller radius bends or shapes, stainless steel expands. While we are on the subject of springs stampings and their heat treatment, the copper base alloys require a lower temperature, particularly phosphor bronze, due to the presence of low melting tin in the alloy.

In reviewing the factors of spring-back in high carbon steel, we treat this phenomenon with the due respect accorded any problem, but we also feel that our years of daily experience with this material prompts us to pass along some food for thought. If you would save money, see your banker; if you would prefer to invest, call your broker; likewise, if high carbon steel spring-back in stampings is detrimental, why not use the facilities of the spring manufacturer in helping overcome your problems?

A Few Helfpul Hints for Making Forging Dies

Appreciable savings, greater accuracy, and speed in the manufacture of forging dies are possible simply through the judicious use of a metal cutting band saw. Drop Dies and Forgings Company of Cleveland is the generous donor of a few valuable pointers on this subject.

First, they use their DoALL Model MP-20 band saw to shank out the corners in forging die blocks varying in thickness between 8″ and 18″. This band saw has an ample 24″ work thickness capacity and is equipped with a 36″ stroke hydraulic table. DoALL machines of this type are also equipped with coolant facilities and variable tool speed control permitting adjustment of machining constants exactly for the job at hand. Pieces up to 3,000 lbs have been cut on this machine. The workpieces are die blocks which Rockwell between 37 and 40 on the "C" scale.

Salvaging Old Die Impressions

Another and very important use of the saw in forging die work is for cutting off die impressions from old die blocks. The advantage gained by this practice is that the sawed off die impressions can be labeled and stored for future reference. These die impressions represent working dies and incorporate the refinements that have been made prior to putting them in service. Then when a new die is made from the master these refinements, which may be added fillets or radii, are readily picked up from the old impression and transferred to the new die. This practice has been found to be more practical than a written record. Formerly, the old impressions were planed off and consequently, this advantage was lost.

Used for Maintenance

Drop Dies and Forgings Company also finds

Fig. 3. Operator is holding the impression which he has just sawed off from an old forging die block.

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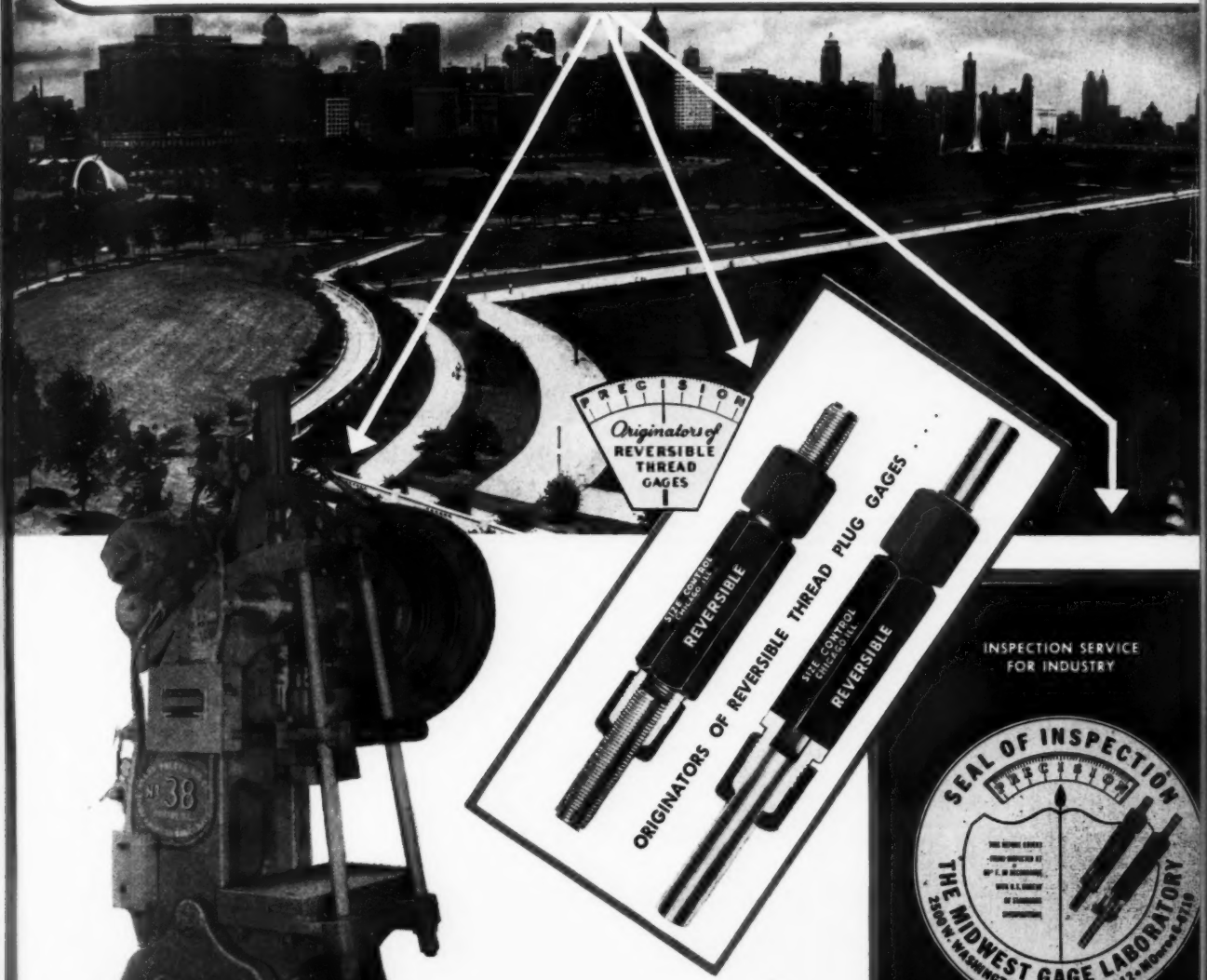

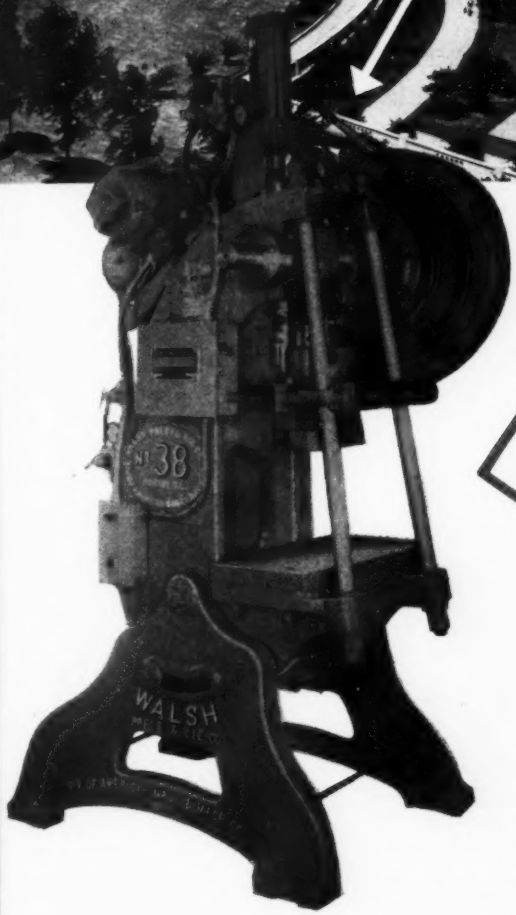

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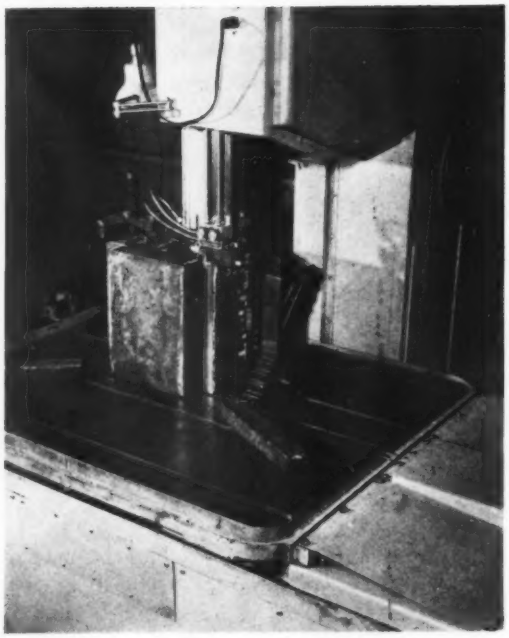


Fig. 1. At Drop Dies and Forgings Company the Contour-matic with a 36″ throat hydraulic table is used for shanking out the corners of forging die blocks up to 18″ thick.

Fig. 4. Operator here is checking squareness of cut after removing the old impression. Impression can be seen at the left. Squareness of cut is excellent due to the rugged base supporting the hydraulically powered table and box-type frame construction of the unit. The machine is also used to cut parts for forging machines.

the large capacity and ruggedness of their DoALL quite handy for maintenance work on forging equipment. Recently, for example, they cut off the end of a hammer ram which weighed approximately 2,500 lbs. Thickness of cut was around 23″ and they were able to do this in about 2 hours using just a carbon steel blade. With the new high speed steel saw bands available, this time could have been reduced even further. Planing time for such a cut is estimated at 12 to 16 hours.

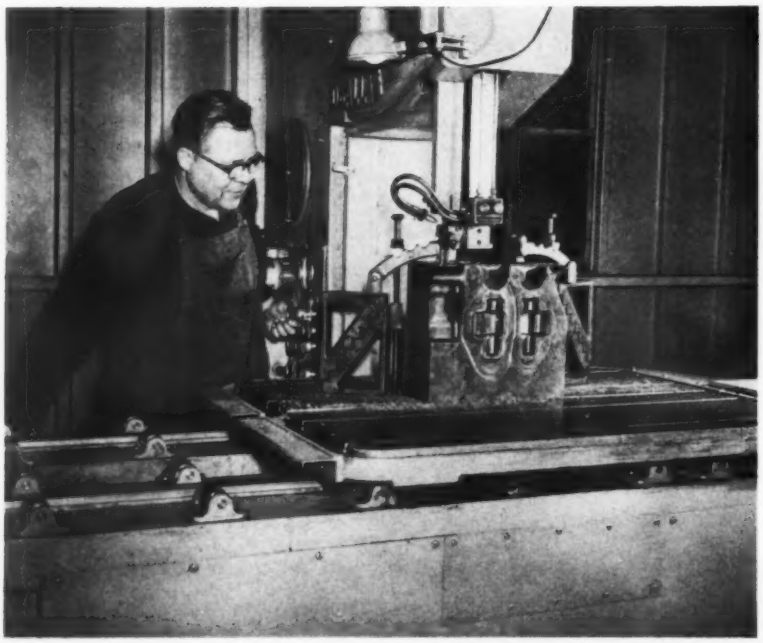
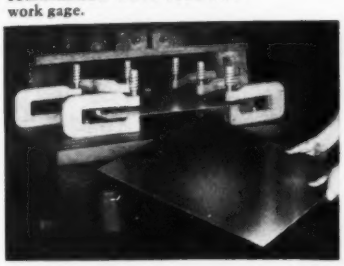


Fig. 2. Another important use of the saw in forging die production is sawing off the old impression from the die block. This old impression is labeled and stored for future reference to the refinements that have been worked into it. Thus, when a new die is made from a master, the refinements, such as added fillets and radii, can be transferred from the old impression to the new die.

Only UNIPUNCH PERFORATING UNITS

have all these exclusive Time-Saving and Cost-Saving features...

Showing a set-up of Unipunch Perforating Units on T-slotted plate. Note the punched work in foreground and the template over die in set-up which is a combination work feed and work gage.



NEW savings from two-piece punches and *NEW* quick, easy interchangeability of button die without disturbing or removing Unipunch Perforating Units from press or press brake set-ups are only two of the many exclusive reasons why this equipment pays for itself faster. Other advantages are "called out" around illustration below.

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CIRCLE INFORM-A-GRAM KEY NO. 961

PROFIT$ IN RECONDITIONING CUTTING TOOL$

by Hiram Ash
Chairman

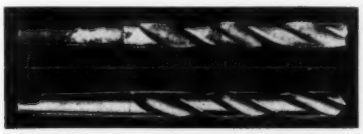
NATIONAL TOOL SALVAGE COMPANY
Detroit, Michigan

THE REASON FOR a tool salvage program, of course, is to save money. This means that a salvaged tool must not only cost less than a new tool but it must also cut as fast, produce as good a finish, and stand up as long as a new tool. In other words, the salvaged tool must be in every respect as good as a new tool, and cost less.

As the first step in establishing a tool salvage program, it is suggested that space be allocated in the tool crib system or tool stores, where all obsolete or worn tools may be collected, sorted, and stored. This space should be adequate to serve the plant. In a small plant, it may be just one corner of the central tool crib; in larger plants, a separate room or department. In large plants, we have known a whole building being set aside for this purpose.

In sorting these tools, it must be kept in mind that in order to save anything, there must be something there of value to save, as we do not think that even a salvageman can make something from nothing.

In the process of salvaging a high speed steel cutting tool, of most types, into a tool that will perform as a new tool, most of the same operations have to be performed that were performed when the tool was originally made. They may be performed in a different way and with different equipment, but practically the whole tool must be reworked,



Broken twist drill repointed, tang cut on taper shank, drill polished.

and this must be done in such a way that the original hardness of the tool is not disturbed. It can, therefore, safely be said that almost the greatest, if not the greatest, savings through salvage of high speed cutting tools comes from saving the high speed steel from which the tool was made, and this is quite a saving, as anyone knows who has to buy high speed steel. In fact, we hate to think what would happen to the tool salvage industry if high speed steel should drop to fifteen or twenty cents a pound.

Reclaimed tools of small dimensions, such as drills under ¾" and reamers under ½", will not as a rule show much of a saving over new tools, and are not worth spending much time on in the salvage department, except where they are present in large quantities of one size. This usually happens in plants devoted to mass production; and, as such plants usually use great quantities of a few sizes of tools, it is important that the tools be re-made into current usable sizes. If this is not possible, the tools may be disposed of or stored for future reference.

Manufacturers that have a number of plants in various cities often solve this problem by some form of exchange between the different plants, or sometimes by actual sales from one plant or department to another, whichever method is most suitable to established accounting procedure. Thus, tools which have been made obsolete by engineering changes, or which have been worn undersize for certain operations, may be reworked for use on other operations at a big saving.

When a new part is being put into production, tool salvage can be of great value when situations develop where special tools are needed in a hurry. It is then often possible to find tools in the salvage department from which the special tools may be made in order to get the job started.

The problems of salvaging tools used in tool and die rooms and in general job shops are usually simpler than salvaging tools for high production jobs. These shops usually can use a greater variety of sizes and in many cases, especially where milling cutters are concerned, the tools may be reworked into the largest possible size to which they will clean up, and will not have to be made into any particular size.

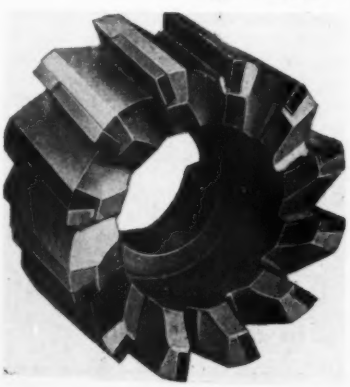
Tools that are badly cracked or broken are not as readily salvageable as sound tools that are just worn undersize. However, there are some possibilities where the tools are costly enough to absorb the extra expense of welding or brazing and still show enough saving over new tools. It should be mentioned, in this connection, that on shank type tools with broken shanks or tangs, new shanks are often butt-welded on.

On special tools such as line-reamers with pilots that have been scored, the pilots can often be restored by chrome plating. This is particularly true with carbide tipped tools, as in this case the carbide tips can also be replaced by new ones and the tool can be refinished to its original size and put back on the job.

Tungsten carbide tools in many respects have even greater possibilities for salvage than high speed steel tools. One reason is their higher replacement cost, but possibly most important is that in nearly all cases the tool after being properly reworked can be used for the same purpose on the same job for which it was originally designed. However, here again it must be borne in

BEFORE

AFTER



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mind that such tools as single point lathe tools, which consist only of a low cost steel shank with a carbide tip brazed to one end, do not leave much of value to salvage after the carbide tip is worn out. But there are a great many carbide tools which consist of an often complicated steel body, which costs many dollars to make, and a number of carbide tips. In such cases, most of the money that went into that steel body can be saved by replacing the

Before

After

carbide tips and finish grinding the tool to its original shape and size.

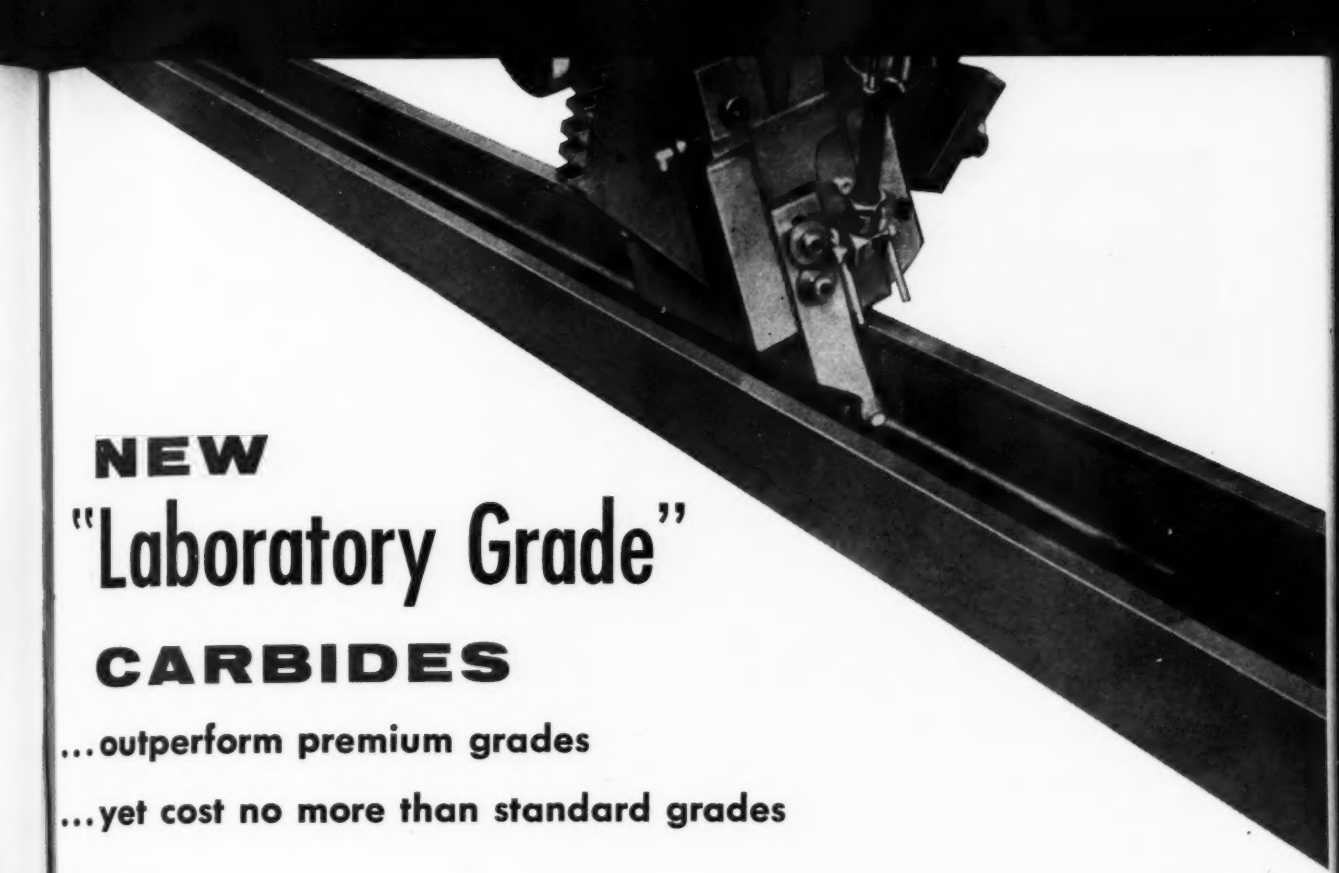
There are some cases where expensive special cutters can be saved by building up cutting edges by welding. There are welding rods that are especially adapted for this purpose; but the success of this operation depends mostly on the skill of the man who does the welding.

There are also many instances where a worn or obsolete high speed cutter may be used as a body on which to braze tungsten carbide tips.

All such special cases require careful and individual consideration before they are attempted.

As to the actual savings that can be made by using salvaged tools, it depends to some extent on sizes, types and condition of tools; but it can be stated that the cost of a salvaged tool usually runs to 50% less than a new tool.

The inform-a-gram card is for your convenience in making inquiries



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And the reason why is a very basic one—We have had a tremendous advantage. Less than two years ago we started from scratch and designed, built and equipped our new plant at McKeesport.

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This efficiency is reflected in the remarkable service life and uniformity of performance of FIRLOMET carbides.

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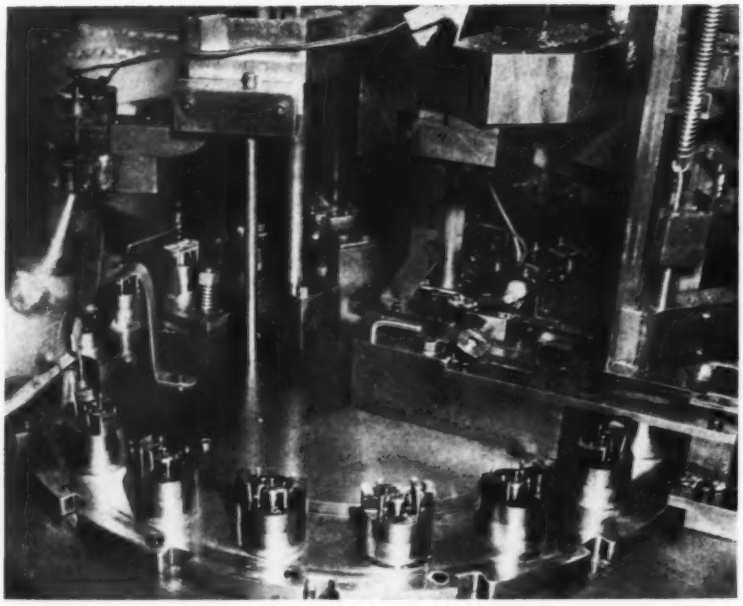


Clamps for Master Rule's wooden folding rules are made and assembled on this Model 50S V & O Press equipped with a dial feed and two progressive dies.

. . . Small Firms from Page 80

The male and female clamp halves are now made on 13-station progressive dies. The springs are positioned in the nests of the dial feed, located at the front of the press, by a cam-actuated slide. As the slide picks up the spring from the magazine and advances it over the nest, a plunger pushes the spring into position. The nest then moves automatically under the blanking station of the die producing the male clamp half. As the clamp half is blanked, a pad inside the punch pushes the clamp half through the die onto the nest over the spring.

Next, the nest moves to the blanking station of the female clamp half, which is also pushed through the die and placed on top of the male clamp half. Eyelets are then automatically inserted into the hole in the center of the assembly from a vibration-type hopper. The assembly advances to a staking station where the eyelet is expanded to complete the clamp. A spring-loaded jaw picks up the clamp and, at the top of the press stroke, a solenoid energized by a micro-switch sliding on the cam of the crankshaft kicks the clamp out into a chute.

The experiences of Omega Ball Bearing Co. and Master Rule Mfg. Co. are indicative of the growing trend toward the use of specially equipped presses as the heart of multi-operation production systems designed for greater productivity. These companies, among others, have proved that ingenuity is not the exclusive property of large firms.

New Book on Machining Aluminum

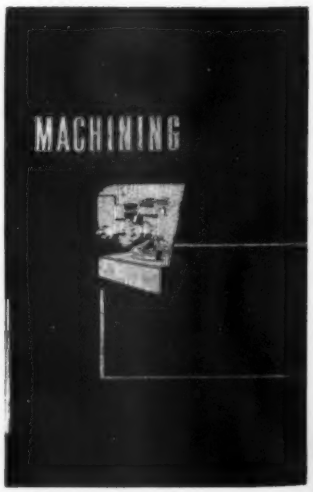
All phases of machining aluminum are presented in the valuable, new 360-page book, "Machining Kaiser Aluminum."

Prepared to assist production, engineering and plant personnel in solving tooling and cutting problems, it stresses specific machining practices to be followed in achieving the most satisfactory and economical production of aluminum parts and products. Comparative and descriptive material on the various types of machine tools, and differences within each category, are shown.

Specific data on alloy characteristics may be used advantageously from a production or product standpoint, and the book's many individual details for practical machining procedure are attractively presented. More than 170 action photos and tooling illustrations, 75 tooling drawings and diagrams, and 40 tables, charts, nomographs show advanced machining methods.

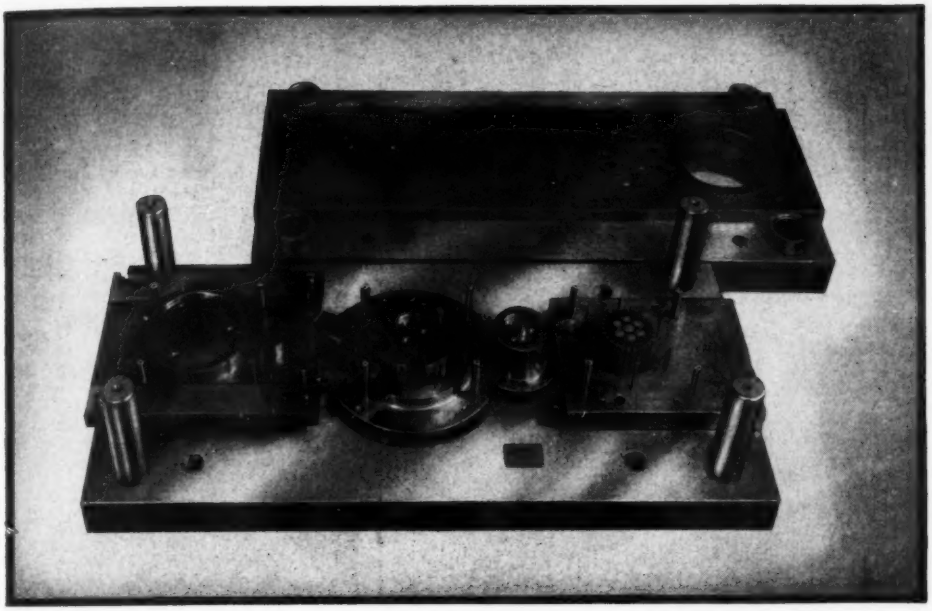
Because aluminum can be machined profitably on standard equipment, the book deals mainly with tooling problems, tool care, and modifications of conventional tools where advisable. The more advanced and special machines are not forgotten, however.

Copies are free when requested on company letterhead. Contact Technical Editor, Dep't B-28, Kaiser Aluminum & Chemical Sales, Inc., 228 N LaSalle St., Chicago 1, Ill.



Although a steel die costs
less initially, this . . .

Carbide-equipped die pays off by outproducing steel die 10 to 1



Precision lamination die, equipped with Carboloy cemented-carbide cutting edges. Produces one million rotor and stator parts per grind, compared to only one hundred thousand per grind with a steel die.

The initial cost of this lamination die equipped with Carboloy® cemented carbide is about twice that of a steel die. But because the carbide die produces 10 times as many parts per grind, the initial investment is more than returned in downtime and grinding savings alone.

This is what the 10 to 1 ratio means to a plant: grinding expense reduced 90%; downtime reduced 90%; output per shift increased; grinding facilities freed for other tasks; scrap reduced because the carbide die holds its accurate tolerances longer; costly finishing work eliminated because parts are burr-free.

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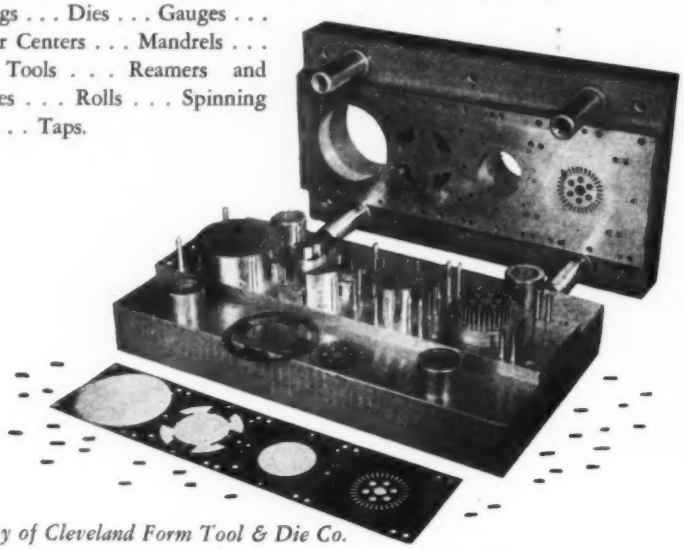

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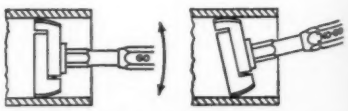
The well-received Hutto adjustable "Boregage", introduced to Industry about a year ago, is now being manufactured and sold by The Maxwell Co. This hard-chrome-plated gage has a sufficiently wide range of adjustment so that only nine gages are required to inspect holes from 1" to 3" in diameter. Only six additional gages are needed to check holes to 6" dia.

The gages are double-ended, each one serving as a GO and NO-GO pair. Gage ends are easily set to a master ring or to gage blocks. An adjusting screw brings the gage anvils to the desired diametric dimension, and another screw working against spring tension permits positive locking to size without danger of upsetting the accuracy of adjustment. The adjusting and locking screws may both be sealed.

A "Boregage" freely enters the hole without any fuss and bother, and gives a quick indication of bell-mouth, taper, or out-of-round. Additionally, manipulation of the NO-GO member gives a ready interpretation of how much of a hole's tolerance is "used up".



Each double-end gage has removable washers for recording the dimensions to which the gages are set. Short sections at the ends of the handle are green and red to indicate GO and NO-GO; notches also are cut in the NO-GO end for identification by feel.

For illustrated, detailed literature write The Maxwell Co., 251 Broadway, Bedford, O.

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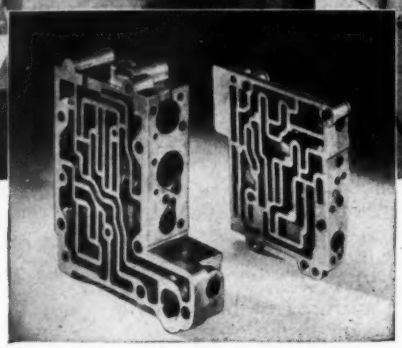

Holes on extremely close centers vary in diameter from 1/16" to 13/16". The valve body has 33; the cover, 18.

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"SO WAS THE RUN ON THIS AUTOMATIC TRANSMISSION PART, BUT". . . .

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This aluminum die casting is processed in its entirety by Zagar planning, except for milling two faces. Two lines of Zagar standardized self-clamping drill jigs ream, tap and drill both valve body and cover. With 24 heads and 24 fixtures, Zagar performs work on 51 holes on close centers. Step tools take care of reaming and burnishing. The fixtures were designed to compensate for slight inaccuracies in the die casting. Thus has Zagar engineering solved an acute problem of limited production without the purchase of costly special machines.

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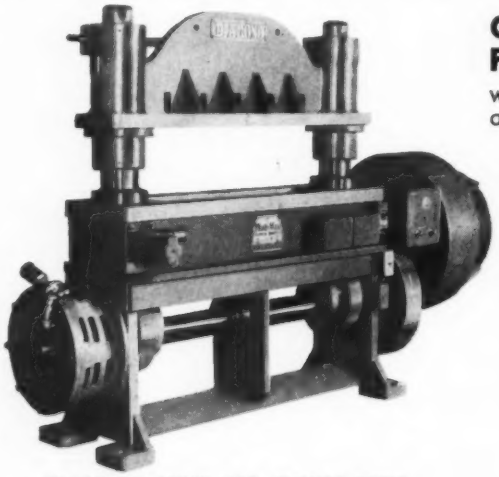
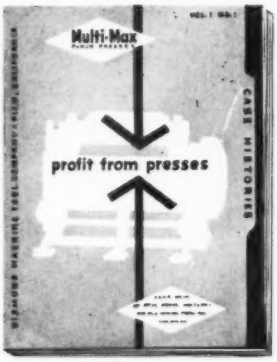


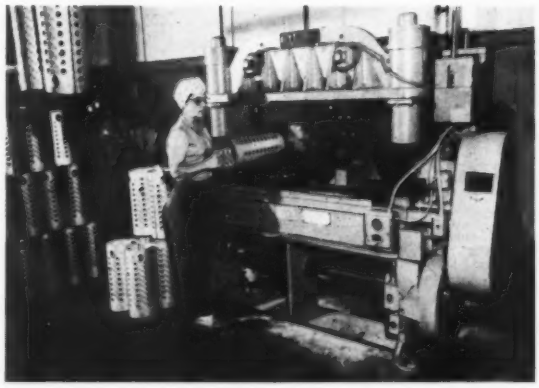
DIAMOND MULTI-MAX PUNCH PRESS
MODEL 5036 ILLUSTRATED

OPEN THROAT PRESSES...

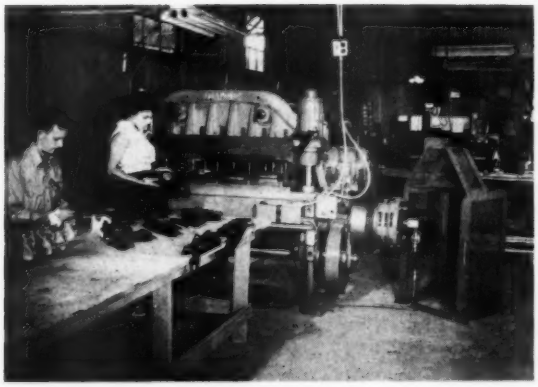
with long bed and ram areas illustrated in a new catalog, "Profit From Presses". Twenty pages with case history photographs such as illustrated below. Diamond Multi-Max punch presses are available in 30 and 50 tons capacity, 100 tons on special order. Six models for your selection. 24", 36", 48", 60", 72" and 84" working surfaces of bed and ram lengths. Air clutch and air brake at no extra cost. Mail in above coupon for your copy of this catalog, or write on your letterhead.



SALES AND SERVICE IN ALL PRINCIPAL CITIES



SOLAR AIRCRAFT COMPANY, SAN DIEGO, one of three Multi-Max presses used by Solar Aircraft Company in perforating parts of combustion chambers for jet engines. Large bed area required for two stage dies. Large shut die height required for insertion and removal of bulky combustion chambers.



SAURENMAN COMPANY, INC., EL MONTE, assembling and riveting Saxton Kant-Twist clamps on a Multi-Max press. Large press bed area is required for the permanent installation of nine dies for riveting nine different size clamps from one inch opening to twelve inch opening. Advantage of this permanent multiple die set up is in riveting various size clamps.

DIAMOND MACHINE TOOL CO.

DIAMOND MACHINE TOOL CO.
PICO, CALIFORNIA

CIRCLE INFORM-A-GRAM KEY NO. 1041

"Commendable Comments"

"More than ever before business managers are thinking of themselves as members of a corporate team rather than a hierarchy; one-man rule is decreasing in the business scene; and 'preparation' has become a key word in employee and supervisory relations as well as within the management group."

—Lawrence A. Appley, President, American Management Association.

"Businessmen not previously engaged in undertakings related to atomic energy development quite properly will ask about economic hazard and risk. A sounder point of view . . . is that it brings with it normal commercial hazards, for those who wish to participate. One might add that it may also offer hazards to others who do not participate. For a business that refuses to take risks may some day find itself left far behind its competitors."

—From an address by J. Frederic Wiese, Vice-President, Lukens Steel Company at the Atomic Trade Fair, Washington, D. C.

"Our problem—in America, is not going to be one of taking care of men who were put out of work by machines—our problem is going to be one of finding enough men to operate the machines that will be developed by the machine tool industry."

—From an address by M. A. Hollengreen, President and General Manager, Landis Tool Company, before the Chicago Chapter A. S. T. E.

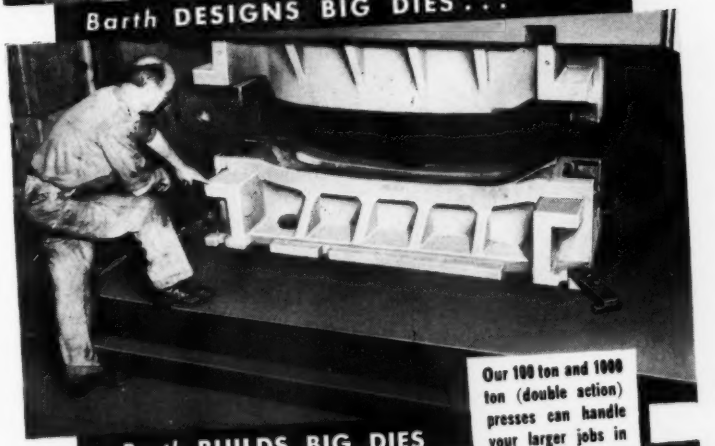
"While our economy is dynamic we do not accept that such an economy is necessarily materialistic. The coolie or the peasant who is chained to the soil merely to grub out his daily living can only be materialistic; but our people, who have the comforts and the leisure and the wherewithal, have every opportunity to develop their cultural and esthetic tastes. Engineers calculated the average human being developed only one-tenth of a horsepower. America is now using over six and a half billion mechanical horsepower, enough to provide 100 horsepower for every wage earner. That's how we get things done, and that's why our economy is dynamic."

—From an address by R. S. Stevenson, President of Allis-Chalmers Mfg. Co. before the Society of Automotive Engineers.

BIG DIE HEADQUARTERS

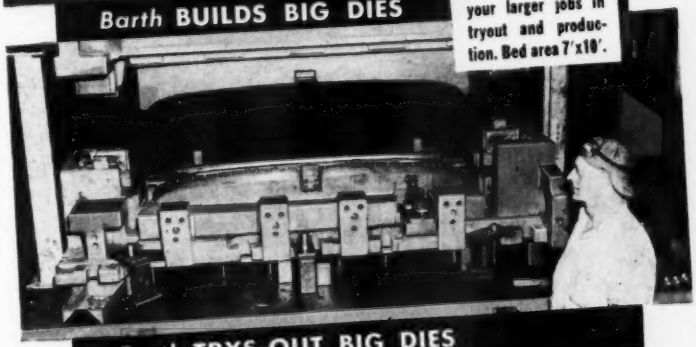
for the AUTOMOTIVE • AVIATION AND APPLIANCE INDUSTRIES

Barth DESIGNS BIG DIES . . .



Our 100 ton and 1000 ton (double action) presses can handle your larger jobs in tryout and production. Bed area 7'x10'.

Barth BUILDS BIG DIES



Barth TRYS-OUT BIG DIES

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MANUFACTURING · DESIGNING · ENGINEERING

DIES • JIGS • FIXTURES • SPECIAL MACHINE • UNIT ASSEMBLIES • AUTOMATION • SERVO MECHANISMS • STAMPINGS

CIRCLE INFORM-A-GRAM KEY NO. 1051

J & L DIE HEADS OFFER *everything!*

- LOW INITIAL COST
- EASE OF OPERATION
- CONTROLLED RESHARPENING
- CLASS III GUARANTEED
- USE OF CARBIDE TIPPED CHASERS WHERE APPLICABLE

FOR BROWN & SHARPE AUTOMATICS and SMALL TURRET LATHES
Capacities from #0 to 1¼"

RADIAL CHASER TYPE
Capacities from #8 to 4¼"

TANGENT CHASER TYPES
Stationary and Revolving
Capacities from #4 to 2"

Only J&L Automatic Opening Die Heads and Chasers give you ALL these features. Write to Dept. 710 for illustrated catalogs and complete information.

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Machine Tool Craftsmen Since 1835

JONES & LAMSON MACHINE CO., 519 Clinton St., Dept. 710, Springfield, Vt., U.S.A.

J&L THREAD TOOL DIV.

CIRCLE INFORM-A-GRAM KEY NO. 1061

How to make any Bandsawing Machine work Better!

1 Select the correct type blade for the job. Your local DoALL man can tell you whether to select Precision, Claw-Tooth, Buttress or other type blade—and the pitch and width to give you best results.

2 Operate the machine properly. Your DoALL man knows the correct feed, speed and band tension to get the most from the blade. For instance, he'll even help you adjust and align the saw guides!

3 Use the best blade money can buy. It will cut faster and last longer. No saw band surpasses a DoALL!

When you call DoALL, you get Sawing Service that will pay you in lower blade cost, lower sawing cost, greater output per hour. Why not try it out today? See your classified directory, or write:

The DoALL Company, Des Plaines, Illinois

WELDED LENGTHS
To Fit Any Machine
AVAILABLE FROM
LOCAL STOCK

Made Sharp...to Stay Sharp!

Also available in 100' and 500' coils for customers having saw band welders.

Ask For New Booklet—
"DoALL 6-Point Sawing-Savings Program"

Call DoALL for Bandsawing Service

Friendly DoALL Stores in 37 Cities

Machine Tools . . . Cutting Tools . . . Gages . . . Granite Plates . . . Tool Steel

56-38

For Ease and Convenience Use TOOLING and PRODUCTION Inform-A-Gram Cards

Opposed Spindle Drilling Machines, horizontal double end machines, and tube expanding machines are some of the machines covered in a catalog from Walter P. Hill, Inc. Operational data and specifications for these and other machines are presented. Copies are supplied by Walter P. Hill, Inc., 22183 Telegraph Rd., Detroit 19, or — **No. B1.**

Standard and Special Gages, and measurement control methods are described and illustrated in an eight-page brochure from Freeland Gauge Co., 9940 Freeland Ave., Detroit 27. It contains photos of some gaging devices, fixtures, and precision size control instruments. The brochure also discusses the Freeland gage Engineering service. **No. B2.**

SPECIAL INTRODUCTORY UNIT

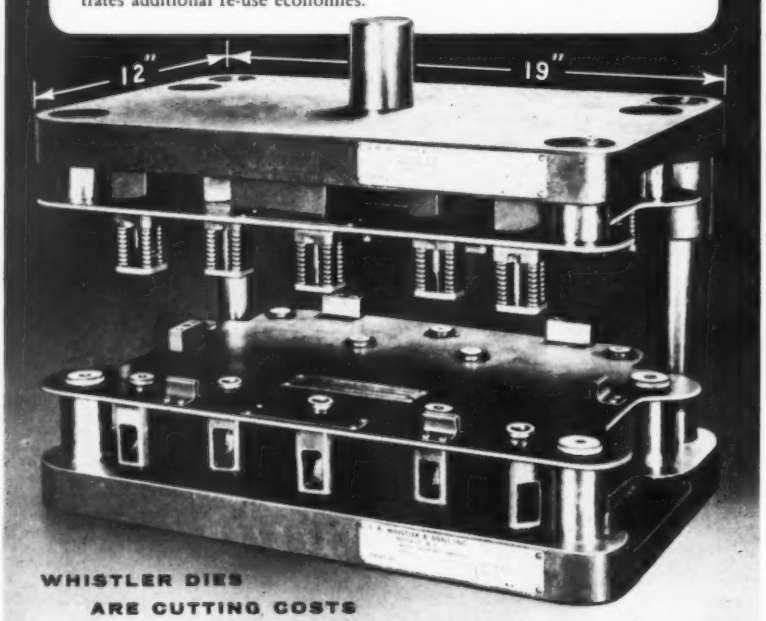
WHISTLER

10 HOLE MAGNETIC PERFORATING DIE

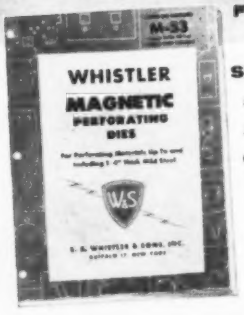
Cut die costs drastically, start production quicker. This M-12-14 Complete Introductory Unit includes a set of blank templates, ten punches, dies, strippers and punch and die retainers complete to make up a ten hole precision perforating die. Any diameters from ⅛" to ½" to your selection. Catalog illustrates additional re-use economies.

$675

NET F. O. B. OUR PLANT



WHISTLER DIES ARE CUTTING COSTS FROM COAST TO COAST



SEND FOR CATALOG Illustration shows how quick and simple it is to set up a Whistler Magnetic Perforating Die ready for production. Larger standard units can be added to suit your requirements.

S. B. WHISTLER & SONS, INC.

Manufacturers of Adjustable, Magnetic and Custom Built Dies for All Industry

748 Military Road **Buffalo 23, New York**

CIRCLE INFORM-A-GRAM KEY NO. 1081

Punch Presses, 7½-ton and 15-ton, are discussed in bulletins from Kenco Mfg. Co., 5211 Telegraph Rd., Los Angeles 22. Model 7 is a standard press for medium-weight punching. Model 7-R has a throat depth of 12¾" and will handle punching, blanking, forming, stamping, and drawing operations. There are two 15-ton models—Model 15 and Model 15R, a deep-throat press. Both are used for high-precision punching. **Circle Inform-A-Gram No. B3.**

Past, Present, and Future Automation Concepts for special machine tools are covered in a 24-page catalog. Twenty new automated transfer-type, line-index, trunnion-type, and rotary-index machine tools are described from both engineering and application points of view. They're used for drilling, tapping, milling, centering, boring, facing, reaming, balance milling, etc. One section is devoted to a glossary of automation words and phrases. Snyder Tool & Engineering Co., 3400 E. Lafayette Ave., Detroit 7, or — **Circle No. B4.**

Improve Milling Accuracy and reduce rejects by using "Micro-Fog" lubrication. A Norgren "lubro-control" unit filters the air, reduces main line air pressure to 30 psi, and creates an air-born "Micro-Fog" to lubricate gearing and bearings, in mill and power heads. Further details are in Blueprint MF 13 which is supplied by C. A. Norgren Co., 3447 S. Elati St., Englewood, Colo., or — **Circle Inform-A-Gram No. B5.**

Helical Carbide Inserts for milling cutters and spiral fluted blanks for end mills, reamers, and drills are highlighted in a new bulletin. Straight gash and uniform section inserts, as well as solid and bushing-type helical shapes are described. Cutter dimensions and prices are given for Type HF straight gash and Type HB uniform section inserts. Get copies of Bulletin B-112 from Kennametal Inc., Latrobe, Pa., or — **Circle Inform-A-Gram No. B6.**

End Wasted Time in placing silver solder in position for brazing by using silver alloy brazing preforms. The preform surrounds the joint evenly, resulting in a smooth brazed surface. "Silver Brazing with Preforms" contains sections on types of joints and recommended preforms, and the importance of flux. A ring weight calculating chart is also included in this technical booklet from Lucas Milhaupt Engineering Co., Cudahy, Wis. **Circle No. B7.**

Circle postage-free Inform-A-Gram Key Number for your request

TOOLING and PRODUCTION'S Inform-A-Gram Section is a CARDload of Information

Control Vibration, Shock, and Noise with "Finnflex Floating Pillow" vibration mountings. They're used on medium and heavy machinery such as air compressors, grinders, punch presses, etc. They're available with load capacities from 500 to 2500 lbs/mounting. In addition to a description of the mountings, load capacities, frequencies, and illustrations of typical installations are given in Catalog FP-55. T. R. Finn Co., Inc., Industrial Div'n, 200 Central Ave., Hawthorne, N. J., or — **Circle Inform-A-Gram No. B8.**

Milling Cutters, Counterbores, End Mills, and Hobs are listed in a new cutter net price catalog from National Twist Drill. Listings on two types of counterbores for aircraft and light metals have been added. Prices, specifications, and illustrations for the complete line are included in Catalog 18-C from National Twist Drill & Tool Co., Rochester, Mich., or — **Inform-A-Gram No. B9.**

In-Process Gaging and final inspection are handled by multidimension gaging machines. "Sigmatic" machines provide one answer to production gaging problems. They check many dimensions simultaneously with speed, accuracy, and dependability. Three types are available — manual, semi-automatic, and fully automatic. Complete details are found in Circular 592 from Pratt & Whitney Co., Inc., W. Hartford 1, Conn., or — **Inform-A-Gram No. B10.**

Machinery Builders' Requirements for follow-through, high speed, and sensitive instrument-controlled relaying devices are met by the ASCO electronic relay. It features no "arc" operation; only micro-amperes are drawn by the grid circuit. Design and application information on the relay, including a diagramed circuit description and dimensional data are in Publication 585 issued by Automatic Switch Co., 391 Lakeside Ave., Orange, N. J. — **No. B11.**

Difficult Lubrication Problems are solved by Electrofilm solid film lubrication. It's used on iron, steel, aluminum, nickel, bronze, etc. A bulletin discusses Electrofilm in a question-answer presentation. The types of manufactured parts successfully using it are also listed. The bulletin is supplied by Electrofilm, Inc., 7116 Laurel Canyon Blvd., P.O. Box 106, N. Hollywood, Calif., or — **Circle Inform-A-Gram No. B12.**

Eliminate Jigs and Manual Positioning with an automatic tape-controlled positioning table for drilling operations. The "Jigmatic" is used with 4' or larger radial drills or under any suitable drill spindle, over a 20" x 30" work area. A bulletin from Arter Grinding Machine Co., Worcester, Mass., contains complete details on the "Jigmatic". — **No. B13.**

Precision Grinding and Lapping Machines are highlighted in a Norton catalog. Brief details plus photos and specifications on the entire Norton line are included. Some of the machines covered are cylindrical grinders; cam, shape, and crankpin grinders; lapping machines, etc. Get Catalog 1843-15 from Norton Co., Worcester 6, Mass., or — **No. B14.**

When it's SERVICE you want ...call PORTER!

3P

IMMEDIATE DELIVERY of 3-P Punches and Die Buttons is made possible because over 37,000 Standard sizes are in STOCK. In fact, Porter Precision Products are stocked in all principal cities.

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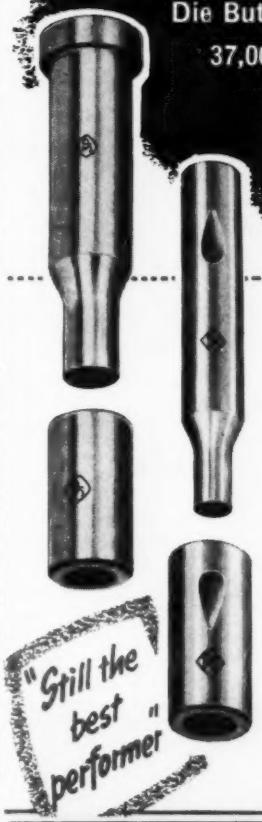

"Still the best performer"

The 3-P catalog can save you thousands of dollars. It contains a perfect pair — to answer every piercing need. PORTER head PUNCHES and DIE BUTTONS are made from three types of finest tool steel, and are offered in any DECIMAL size.

Completing Porter's Production team are the new 3-P BAL-LOK* Punches and Die Buttons. These, too, are available for immediate delivery, any DECIMAL size. "Down time" is cut to a minimum — and you pay nothing extra for the extra quality — or for DECIMAL sizes. Better yet, all PORTER PUNCHES and DIE BUTTONS are completely interchangeable! So save time — save money. Write for full details today, and get the PUNCH you need — WHEN you need it!

* Reg.

PORTER PRECISION PRODUCTS

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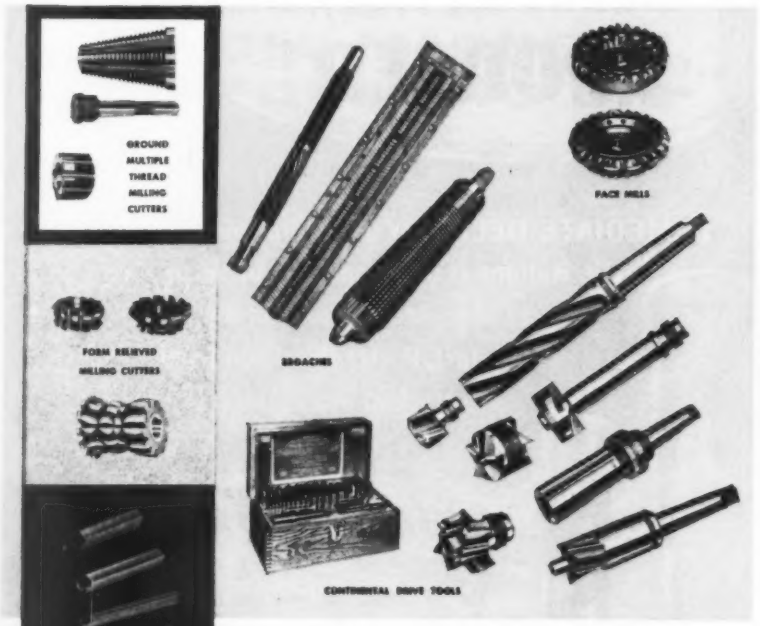
CIRCLE INFORM-A-GRAM KEY NO. 1091

An Instrument Development Service has been announced by Micrometrical Development Corp., 2821 S. State St., Ann Arbor, Mich. This service includes the design, development, building, and testing of electro-mechanical instrumentation for measuring displacements and surface chracteristics, etc. **Circle No. B15.**

The Evolution of Three Dimensional Cams from theory to a working finished product is described in a new folder from Parker Stamp Works, Inc., 650 Franklin Ave., Hartford, Conn. The folder features illustrations indicating the number of stations possible on the cams. These cams are used in automation, instrumentation, supersonic aircraft, etc. **Circle Inform-A-Gram No. B16.**

The 30-Kw Induction Heater for the metalworking industry is described in a bulletin from Westinghouse. The unit is used for hardening and heat-treating operations, metal joining, hot heading, and forging. Bulletin 85-875 is available from Westinghouse Electric Corp., P.O. Box 2099, Pittsburgh 30, or — **Circle Inform-A-Gram No. B17.**



Why These Cutting Tools are

Production Proved

Continental is an Ex-Cell-O subsidiary.

As such, we are constantly trying out new tool designs, new methods, in Ex-Cell-O's big parts production shops.

There could be no finer "proving ground" for testing new materials and new methods. There are no finer cutting tools than "Production-Proved" tools by Continental.

Call in your Ex-Cell-O representative or contact Continental in Detroit for information about them.

CTW

55-31

Continental TOOL WORKS

Division of Ex-Cell-O Corporation, Detroit 32, Mich.

CIRCLE INFORM-A-GRAM KEY NO. 1101

The Complete Line of Wells metal cutting band saws are covered in an eight-page catalog. The saws range in capacity from 3½" x 6" to 12" x 16". Automatic bar feed equipment, stock stands, and accessories are also described. Included is a blade and speed selection chart for cutting various materials. Catalog G-55 is issued by Wells Mfg. Corp., 1940 Cedar St., Three Rivers, Mich., or — **Circle Inform-A-Gram No. B18.**

The Functions and Advantages of Wax in the metal forming operation is explained in "Drawing and Forming" released by Johnson's Wax. It tells why wax provides lubrication under extreme pressures as high as 200,000 psi and temperatures over

450°. The part that polar attraction plays in keeping wax lubricant on the die and blank surfaces is also discussed. Johnson's "Wax-Draw" forms a coating that prevents metal to metal contact to produce perfectly formed parts. Johnson & Son, Inc., Industrial Products Dept., Racine, Wis., or — **Circle No. B19.**

Stop Noise-Shock. "Quietaire" pneumatic silencers reduce the sounds from air-operated equipment. These all-metal units have no parts to be replaced and are corrosion-resistant. Complete details are found in a folder from the manufacturer, C. W. Morris Co., 10628 Cloverdale, Detroit 4, or — **Circle No. B20.**

Electric Heat Treating Furnaces and Ovens are featured in a new catalog. A description, complete with dimensions, specifications, temperatures, and control data, of the Cooley line is presented. Also included is information on Models GA-3 and GA-4, first of a new series of controlled atmosphere tool room furnaces for operation to 2000°F. Cooley furnaces and ovens are used for hardening, tempering, annealing, drawing, etc. Details are in Catalog J-1 from Cooley Electric Mfg. Corp., 38 S. Shelby St., Indianapolis 7, or— **Circle Inform-A-Gram No. B21.**

Dial Gages and "Setmasters" for measuring inside and outside dimensions on machine parts are covered in a catalog from Boice Mfg. Co. Inc., Staatsburg, N. Y. It features ruled sketch sheets for quickly submitting gaging problems to Boice. Illustrations, diagrams, charts, and descriptions of the company's complete line are included in Bulletin 55. **Circle Inform-A-Gram No. B22.**

Multi-Colored Tables in the "Tex-Book" issued by Allis-Chalmers insure quick, easy selection of constant speed "Texrope" V-belt drives. The booklet contains information on design features, basic drive principles, and technical data on sheaves. In addition, it gives suggestions for the economical, safe, and dependable operation of V-belt drives. The illustrated booklet also covers the advantages of "Texrope" drives. Copies of "Tex-Book" 20P40 are available from Allis-Chalmers Mfg. Co., 1013 S. 70th St., Milwaukee, or **Circle Inform-A-Gram No. B23.**

Dimensional Data on over 100 fixture clamps and 1000 fixture details is found in a catalog from Harco Engineering, 12092 Woodbine Ave., Detroit 39. Fixture details listed con-

sist of location pins, swivel shoes, half and quarter turn screws, C washers, etc. Included are hand knob, acorn nut, and quick-action cam clamps. **Circle No. B24.**

Precision Tools for multiple-spindle machines are presented in a new Scully-Jones bulletin. Applications for "quick-lock" adjustable adapter assemblies and bodies, "quick-lock" nuts, spindle extension assemblies, and "Toolitrol" boards and gages are discussed. Copies of Bulletin 6-50 containing the dimensions of the tools, are supplied by Scully-Jones and Co., 1901 S. Rockwell St., Chicago 8, or — **Circle No. B25.**

Accurate 3-Dimensional Tracer-Controlled Reproduction is possible with the "Velvetrace" milling machine. It features a wide range of spindle speeds, 310 to 10,800 rpm, to handle a variety of cutters and materials. Details on the machine's operations and features are given in Circular 590 issued by Pratt & Whitney Co., Inc., W. Hartford 1, Conn. **Circle Inform-A-Gram No. B26.**

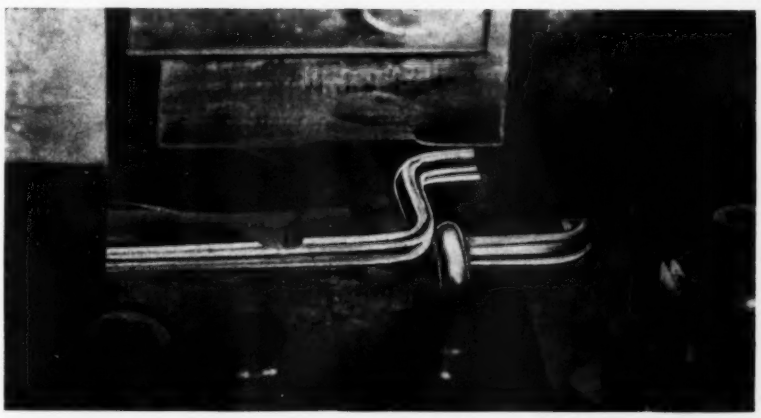
Automatic Coil Handling Equipment is featured in a new Rowe brochure. Rowe "Easy Load" cradles, punch roll press feeds, punch roll attachments, sheet fanners, and straightening and feeding machines are described and illustrated, complete with specifications. Copies of the brochure may be obtained from Rowe Machinery Mfg. Co., Inc., 1506 N. Industrial Blvd., Dallas, Tex., or — **Circle Inform-A-Gram No. B27.**

A 60-Page Tool Room Supply Catalog illustrates and describes new, ingenious and standard tool room accessories and components. Copies of the catalog may be obtained by contacting Reid Tool Supply Co., Muskegon, Mich., or — **No. B28.**

NILSON 4-SLIDES PAY OFF 4 WAYS

• BIG PROFITS • BIG PRODUCTION

• BIG SAVINGS • BIG GAIN IN ACCURACY



Forming Operation: Meter Shunts of 3/16" Wire Stock

WHY NILSON IS TOPS FOR 4-SLIDES:

Nilson 4-Slides are built for rugged duty

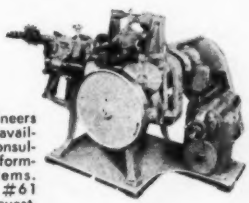
Form both ribbon metal and wire stock

Press capacities 8 to 75 tons, wire diameter to ½"

16 Models Available, Including Combinations of Horizontal Press and 4-Slide

YOU PROFIT BY:

Automatic Operation • Increased Production • No Secondary Handling • Improved Products • Fewer Rejects • Lowest Initial Cost



Nilson engineers are always available for consultation on forming problems. Bulletin #61 sent on request.

Nilson's 3 tilt and 3 stationary reels handle wire or ribbon stock coils up to 500 pounds.

A.H. NILSON MACHINE COMPANY

1522 RAILROAD AVENUE, BRIDGEPORT 5, CONN.

Automatic Chain Making Machines • Staple Forming Machines • Wire and Stock Reels • Wire Straightening Equipment • Slide Feeds for Presses • Wire and Ribbon Stock Forming Machines

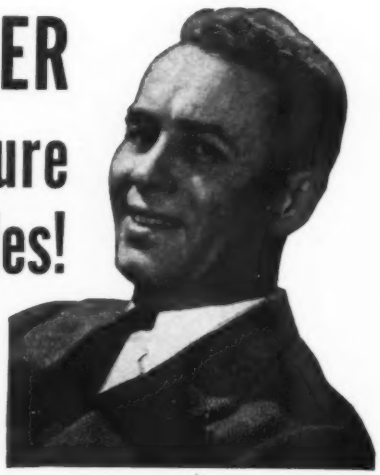
CIRCLE INFORM-A-GRAM KEY NO. 1111

The Torque Control Clutch for power screwdrivers operates on a new frictionless, ball bearing principle. This clutch maintains predetermined torque automatically on all jobs. Absolute torque accuracy is assured with or without lubrication. Full details are given in a brochure from Livermont, Inc., Maple and Myrtle, Monrovia, Calif., or — **Circle Inform-A-Gram No. B29.**

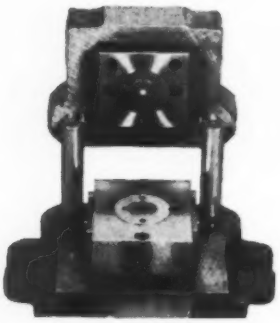
A New Concept in Polishing is the "Kon-Toor" wheel. It's a flexible, all-coated abrasive wheel that hugs curved areas and polishes them with equal pressure at all points. The wheels are available in 2" to 7" face widths with a standard 17" O.D. A folder illustrating actual operations is available from Behr-Manning, Troy, N. Y., or — **Circle No. B30.**

"Instrument Quality" Compressed Air is provided by Hankison condensifilters. They combine a dehydrator and a mechanical filter in a single compact unit. Bulletin M-7155 describes and illustrates the equipment that is available from Hankison Corp., 951 Bankville Rd., Pittsburgh 16. **Inform-A-Gram No. B31.**

"HOVIS WASHER DIES have sure solved our troubles!



"You, too, should make washers the economical Hovis way. Save time, labor, materials and storage space"



Made in 5 sizes:
¾"- 1½"- 2½"- 4"- 6"
Write for Literature

NO NEED TO MAKE A NEW DIE FOR EVERY STAMPED PART

The modern method adopted by manufacturers nationally . . . These *Patented* Dies provide a Master Holder by which, upon simply and quickly removing and replacing Five, Small Interchangeable Parts, a new size washer may be produced . . . Special sets of parts available for use in these units . . . This method makes possible production of irregularly shaped pieces and shallow draws . . . Multi-Washer Dies designed and manufactured.

HOVIS SCREWLOCK COMPANY

8100 E. NINE MILE ROAD
Phone: Slocum 7-4800

VAN DYKE, MICHIGAN
Suburb of Detroit

CIRCLE INFORM-A-GRAM KEY NO. 1121

"Inventory Control for Manufacturers" explains how inventory control balances stocks and reduces costs. The essential principles of a good inventory control record are outlined. Colored graphs and illustrations supplement the explanation. The "Kardex Signal Control" that is discussed is a Remington Rand development which automatically and visibly interprets the inventory balance-on-hand figure in terms of what's needed to keep it in balance. The booklet is supplied by Remington Rand, Div'n of Sperry Rand Corp., 315 — 4th Ave., New York 10, or — **Circle Inform-A-Gram No. B32.**

Reduce Production Costs by using Bellows "controlled-air-power" devices. These work units perform work feeding, work holding, and tool feeding operations and are practical for long and short run jobs. An eight-page booklet describes and illustrates the complete Bellows line of packaged work units. Get your copy of Bulletin ML-3 from The Bellows Co., 222 W. Market St., Akron, O., or — **Inform-A-Gram No. B33.**

Stop Tool Breakage and material spoilage on turret and larger lathes with the Star sensitive turret attachment. Tapping operations from 6/32" to 4" tap; and centering, drilling, reaming, and counterboring are done with greater ease. It features vernier depth control to insure accurate tolerances. Full details on the attachment are given in a folder from E. F. Vilter Co., 4161 N. Richards St., Milwaukee 12, Wis., or — **Circle Inform-A-Gram No. B34.**

New 21" Cincinnati Sliding Head Floor Drills are available with a box or round column. The box column machines have multi-spindle arrangements. These drills have geared power feed for easier drilling and higher production. Their features are illustrated and explained in Catalog D-140 which also includes specifications and diagrams. Cincinnati Lathe and Tool Co., Cincinnati 9, O., or — **Circle No. B35.**

Two New Solders used in joining aluminum where 18,000 or 20,000 psi sheer strength is adequate, are introduced in "How to Use and Apply Alloys and Fluxes for Soldering, Brazing, and Welding Aluminum and Aluminum Alloys". It presents data on two other solders and information on the applications of twelve aluminums. In addition, the advantages of each alloy are presented in the folder from All-State Welding Alloys Co., 249-55 Ferris Ave., White Plains, N. Y. or — **No. B36.**

Precision Mechanism Manufacture Technology is pictorially reviewed in "Production Processing and Service Facilities". This catalog has been released by Allied Products Div'n, Hamilton Watch Co., Lancaster, Pa. Separate sections cover plate processing, mass production of small parts, tool and die production, metals processing, and assembly and development. Hamilton specializes in economical mass production of parts and/or products with close tolerances. **Inform-A-Gram No. B37.**

Open Back, Inclinable Presses are the subject of Bulletin 13 from The Federal Press Co., Elkhart, Ind. The new No. 8 standard geared type press with a 100-ton capacity is featured. Included are illustrations and details on other standard and special presses. Detailed explanations of the air-clutch and the dial feed presses plus diagrams are also presented. In addition, the features of Federal presses are discussed. **Circle Inform-A-Gram No. B38.**

Reduce Heat Treating Costs with a continuous automatic installation for heat treating, quenching, washing, and tempering. These installations with production capacities from 100 lbs/hr up to 800 lbs/hr are made "in line" or in a "reversing loop". They assure uniformity of processing and handle small as well as large production lots on a continuous basis. Full details are in Catalog 850.10 from American Gas Furnace Co., 584 Lafayette St., Elizabeth. N. J., or — **Circle No. B39.**

Two New "Molykote" Lubricants, Types 165X and LOEX, are available from The Alpha Molykote Corp., 65 Harvard Ave., Stamford, Conn. Type 165X is an open gear lubricant for use on highly loaded gears which can only be lubricated infrequently. It forms a film of molybdenum disulfide in the gear teeth. Particularly suited for extreme low temperature uses is Type LOEX. Complete information is found in Bulletin 105 which is available from the company, or — **Circle Inform-A-Gram No. B40.**

The Revision of Tap Standards is explained, complete with a conversion table, in a Royco Catalog. Now there is one grade of ground thread tap, called "ground thread." Tables give the pitch, thread limits, and blank dimensions for standard taps. Other tables give basic thread dimensions and tap drill sizes for machine screw and fractional sizes. One section presents technical data on special taps. Catalog 26 is supplied by Royco Tap & Tool Corp., P.O. Box 268, North Branch, Mich., or — **Circle Inform-A-Gram No. B41.**

Actual Applications of Landahl chainless conveyors are shown in a new bulletin. These conveyors have a patented trolley unit which eliminates special roller turns, sprockets, or traction wheels. Bulletin G-100 discusses their advantages and features. The Landahl Conveyor Co., 13107 Athens Ave., Cleveland 7, or— **Circle Inform-A-Gram No. B42.**

Fully Automatic Gear Grinding Machines are highlighted in an eight-page brochure. They feature a cooling device insuring non-tempered gears, automatic down feed, and a multi-ribbed grinding wheel. Higher production in manufacturing gears, splines, and specially contoured parts is possible when using them. The brochure from Gear Grinding Machine Co., 3901 Christopher, Detroit 11, describes and illustrates the complete line of these machines. **Inform-A-Gram No. B43.**

Banish Moisture from Compressed Air by using Murphy compressed air specialties. The complete line of separators, aftercoolers, and accessories for air power are presented in a folder from Jas. A. Murphy & Co., Inc., Hamilton, O., or — **Circle Inform-A-Gram No. B44.**

A NEW CONCEPT!
MOHAWK
Size-Optional
SUBLAND
Believing that there is too great a void between standard and special tooling, Mohawk has designed and developed a semi-standard subland tool.
The Mohawk Size-Optional Subland is machined, hardened and placed in a stock bin. This results in a material saving to the customer in set-up costs, reduces delivery time to a fraction of that usually required for special tools, and allows a tremendous reduction in inventory. In ordering these Size-Optional Sublands, the customer is limited only in relation to shank specifications, and partially on overall length requirements. Diameters and step lengths are completely optional to fit the particular application.
Write for full details.
1 2 3
SUBLAND DRILL (2-2)
(1) Drill—Chamfer
(2) Drill—Counterbore
(3) Drill—Drill
NORMAL DELIVERY
1 WEEK
FROM RECEIPT OF ORDER
Mohawk
TOOLS, Inc.
910 E. MAIN ST., MONTPELIER, OHIO
worlds largest producer of Sublands
CIRCLE INFORM-A-GRAM KEY NO. 1131

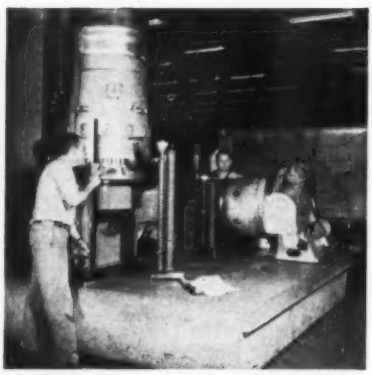
Fast, Accurate Small Punching at lowest cost is performed by the Kenco 1½-ton punch press. Model 1, a standard press, punches small parts at speeds up to 300 pcs/min. Model 1-R, a deep-throat, rigid rib press, features a 7" throat and large die space. Full details on both models are given in a brochure from Kenco Mfg. Co., 5211 Telegraph Rd., Los Angeles 22, or — **Circle No. B45.**

"Here Is the Solution to Your High Chipping Cost" introduces a new pneumatic chisel shaft. The Delaware SN shank eliminates shank breakage and makes chipping operations safer. It features a shank as strong as the chisel body and has no sharp shoulders. Delaware Tool Steel Corp., Wilmington 99, Del., or **Circle Inform-A-Gram No. B46.**

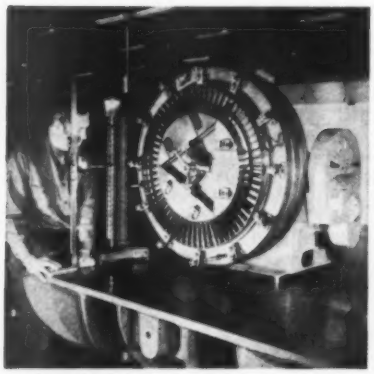
How the De Silvey Plant Rebuilds and reconditions Warner & Swasey machines is pictorially told in a brochure from The De Silvey Corp., 200 Pennsylvania Ave., E. Aurora, N. Y. The operations are followed step by step from the time a machine arrives in the plant. **Circle No. B47.**

ROTABS Beat Precision Inspection Costs...

This 24" ROTAB plus centering fixture cuts checking time for 11 dimensions on six vane segments from several hours to 5 minutes each.



Checking big jet engine assemblies is fast and simple on ROTABS (36" & 48"), eliminates costly fixtures made obsolete by engineering changes.



Seconds-of-arc precision allows quick, accurate inspection with low cost standard gages. Here 36" powered unit checks vane spacing.

For small parts inspection this 12" universal ROTAB minimizes setup and inspection time, does not require power for tilting and rotation.

For complete data on the optical precision readings you get with the ROTAB at the lowest cost, write:

MACHINE PRODUCTS CORP.

6771 East McNichols Road . Dept. C . Detroit 12, Michigan

CIRCLE INFORM-A-GRAM KEY NO. 1141

"Precision Instrument Components" lists the complete line of automation and instrument parts available from stock. An automation system can be designed in a short time, using only a minimum of special parts. The standard stock parts presented in the 64-page catalog are dimensioned for design and detail layout with complete tolerances. Get copies of Catalog 7 from PIC Design Corp., 160 Atlantic Ave., Lynbrook, L. I., N. Y., or — **Circle No. B48.**

Pretreatment of Dies, Piercers, and Tools used in metal-forming operations is discussed in a new technical fact sheet. Suggestions for lubrication during the break-in period using "Aquadag", a dispersion of colloidal graphite in water, are given. It forms a dry lubricating film that's highly tenacious and heat resistant. Copies of " 'Dag' Colloidal Dispersion for Tool Pre-Treatment" may be obtained from Acheson Colloids Co., Port Huron, Mich., or — **Circle Inform-A-Gram No. B49.**

Easy-To-Handle Aluminum Conveyors are illustrated and described in a folder published by Harry J. Ferguson Co., Jenkintown, Pa. Both gravity roller and gravity wheel conveyors in "set low" "or set high" types are covered. The "set low" type has channels to keep small packages from slipping off and the "set high" handles packages wider than the conveyor width. They're for use alone or for lengthening existing conveyor lines. **Circle No. B50.**

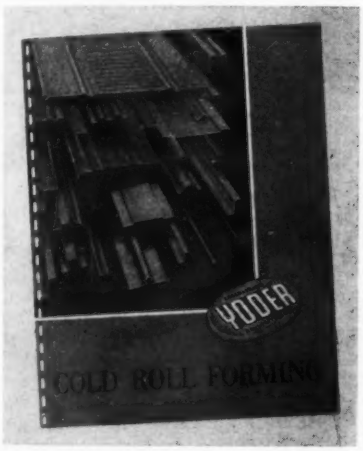
A Combination Hydraulic Facing and Straightening Press is featured in a Holmes specifications manual. A blue print, detailed dimensions, and complete specifications of the press are included. Also presented are engineering data and formulas, construction details, illustrations, and a discussion of its features. Stanley H. Holmes Co., 3300 W. Lake St., Chicago 24, or — **Circle No. B51.**

Grind Large Bed Castings, columns, tables, slides, saddles, and heads to precision tolerances, faster, without expensive rehandling, by using a new combination way and surface grinder. This machine has independent horizontal and vertical spindles to hold machined surfaces in accurate relative alignment. It features a pendant control panel and a vertical spindle truing device that is adjustable from 30° to 60°. The unique three-column box type construction which assures maximum stock removal and fine finish is explained in a booklet from Mattison Machine Works, 545 Blackhawk Park Ave., Rockford, Ill. **Circle No. B52.**

A New Diamond Saver for use on the J & S "Fluidmotion" wheel dresser has been produced by J & S Tool. It has a tapered "Vee" to permit rotation of the diamond at the negative angle. As a flat develops on the wear side, the diamond is revolved to a sharper side. The saver features a micrometer feed with a 1-3/16" maximum travel, and accuracy within 0.0001". Details are supplied by J & S Tool Co., Inc., 87 Dorsa Ave., Livingston, N. J., or — **Circle Inform-A-Gram No. B53.**

The Capacity Range of Keller power hack saws is now from 4" x 4" to 10½" x 9". The complete line of these saws is featured in a bulletin from Sales Service Machine Tool Co., 2363 University Ave., St. Paul 14, Minn., or — **Circle No. B54.**

"Cold Roll Forming" is an illustrated story of the equipment and the cold roll forming process. The scope, function and economies of the process are covered. Also shown are the end uses of its products and their advantages and commercial possibilities. In addition, auxiliary equip-



ment for curving, coiling, ring-forming, notching, perforating, welding, embossing, automatic cut-off, etc. is presented. Copies of the 4th (revised) edition of the Yoder book may be obtained by writing directly to The Yoder Co., 5526 Walworth Ave., Cleveland 2.

For Fast Stock Removal, Accurate Sizing, and smooth surface finishes, use Sunnen portable hones. They're excellent for small lot or odd size production, salvage and production repair, selective fitting of precision mated parts, and repair and maintenance of operating equipment. The catalog, "Sunnen Portable Hones", contains illustrations of on-the-job applications and details on the hones and stone sets. Sunnen Products Co., 7910 Manchester Ave., St. Louis 17, Mo., or — **Circle No. B55.**

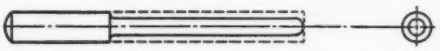
"Marking Tools and Marking Equipment" illustrates and explains marking tools from hand stamps to automatic marking machines. In addition, it discusses the products on which they're used and various fixture setups for marking operations. Copies of Brochure 11 are available from Geo. T. Schmidt, Inc., 4100 Ravenswood Ave., Chicago 13, or — **Circle Inform-A-Gram No. B56.**

"3-Dimensional Panto-Miller" describes, illustrates, and gives engineering specifications for Model 3-A panto-miller. It's a tracer-controlled production machine for engraving, profiling, die cutting, and milling. A brochure from Johnson & Bassett Inc., Production Tool Div'n, Worcester, Mass., also lists the available accessories and other J & B products. **Circle Inform-A-Gram No. B57.**

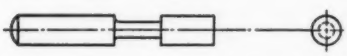
The "Cyclomatic" Power Baling System is featured in a brochure from Balemaster, Div'n of East Chicago Machine Tool Corp., 4801 Railroad Ave., E. Chicago, Ind. Designed to eliminate man power in baling bulk paper, paper trimmings, etc., it conveys, hogs, and bales up to four tons/hr. **Inform-A-Gram No. B58.**

Swaging Success Stories

Close Tolerances... without Machining



This finished piece used to be made on an automatic screw machine with the long, narrow diameter section turned to .100 ±.003 and a necessary sharp shoulder



Torrington's swaging experts suggested starting with this simple screw machine blank (to retain the required shoulder).

Result after one rotary swage—an improved finished piece, to a tolerance of ±.001.

Why not write for our informative booklet on swaging that includes complete descriptions of Torrington Rotary Swagers. It may show you how you can achieve a "swaging success story" in your own plant.

See what savings you can make by swaging

1. Saving in material—swaging uses nearly all the metal.
2. Saving in time—swaging is fast.
3. Saving in labor—unskilled labor can run a swager.
4. Saving in machining—swaging produces finishes accurate to ±.001.
5. Saving in finishing operations—swaging produces high finish, better hardness and resiliency.

THE TORRINGTON COMPANY
Swager Department
6 North Street, Torrington, Conn.
Makers of Torrington Needle Bearings

TORRINGTON ROTARY SWAGING MACHINES

CIRCLE INFORM-A-GRAM KEY NO. 1151

Tool Holders and Cutters are described and illustrated in a new Viking catalog. Two types of milling cutters are available — carbide and high speed steel. Photos of special cutters and holders made with the Viking wedge lock design are also shown. Copies of the catalog may be obtained from The Viking Tool Co., Shelton, Conn., or — **Circle Inform-A-Gram No. B59.**

A Continuous Surface Broaching Machine has a 154" stroke length. The Colonial "One-Way" machine is the first of a line of chain-type verticals. Its design permits increase of the stroke length up to 200". Complete information is given in illustrated Bulletin VCA-55 which is supplied by Colonial Broach and Machine Co., P.O. Box 37, Harper Station, Detroit 13, or — **Circle Inform-A-Gram No. B60.**

"How To Sharpen Curved Tooth Milling Cutters" is a technical data sheet produced for the metalworking industry. It presents tables for disc and cup wheel grinding. For copies of the sheet, write to Aber Engineering Works, Inc., Waterford, Wis., or — **Inform-A-Gram No. B61.**

THIS NEW 14" *Logan* LATHE

PERFORMS...

AND THE RESULTS PROVE ITS SUPERIORITY

The more jobs you watch this rugged new Logan "6560" perform, the more impressive it looks, On the heaviest cuts, or at maximum speed, it turns the work *smoothly*, quietly, with precision results. Superior performance is designed, engineered and built into it.

The Variable Speed Drive provides instant spindle speed correction. The oversize spindle, with 1⅜" bore, turns on a ball bearing mounting that needs no adjustment within the full range of 38 to 1200 rpm. The bed is a wide, deep special alloy casting, extra heavy and resistant to both internal and external stresses. The two V-ways and two flat ways are precision ground. Extra strength and weight throughout, plus dynamic balancing of the complete lathe practically eliminates vibration. Moderate price and low cost operation make the "6560" outstanding in economy as well as in precision performance. Write for Bulletin 14-L, giving a full description.

SPECIFICATIONS AND FEATURES

14⅛" swing over bed
9" swing over saddle
1⅜" spindle hole
1" collet capacity
40" between centers

Variable Speed Drive
Ball Bearing Spindle
38 to 1200 rpm
Two-V-way, Two-flat way, Precision Ground Bed
Precision Carriage

LOOK TO LOGAN FOR BETTER LATHES AND SHAPERS

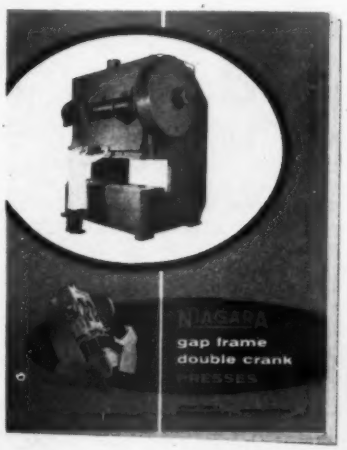
LOGAN ENGINEERING CO.

Lawrence and Lamon Ave., Chicago 30, Ill.

CIRCLE INFORM-A-GRAM KEY NO. 1161

Machine Shop Equipment and supplies are featured in a Montgomery catalog. Among the Grand products illustrated and described are angle and surface plates, precision live centers, milling machine and shell end mill arbors, adaptors, etc. Also presented is technical data on Grand drill jig bushings. Montgomery Tools, 7 Tichenor Lane, Newark 5, N. Y., or — **Inform-A-Gram No. B62.**

Niagara Gap Frame Double Crank Presses are presented in a 26-page bulletin. The modernized line consists of upright Series B and open-back inclinable Series BI. The construction features are explained and



illustrated. They include abundance and all-side accessibility of die area, and oversize air counterbalance. Bulletin 65C from Niagara Machine & Tool Works, 683 Northland Ave., Buffalo 11, contains specifications for both series. **Circle No. B63.**

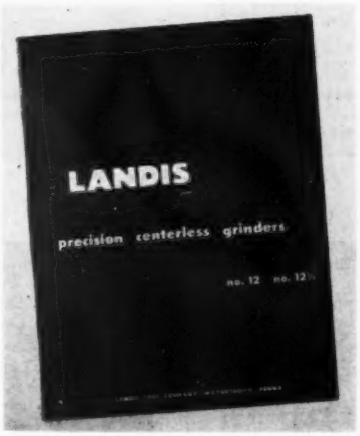
Newton Vertical Rotaries are featured in an illustrated bulletin. Their advantages are discussed in terms of operation. Also given are the applications and the types and dimensions of milling machines to be used. In addition, the formula for rotary milling is included. Get copies of Bulletin 651 from Consolidated Machine Tool Corp., Rochester 10, N. Y., or — **Circle No. B64.**

Precision Needle Rollers are highlighted in an illustrated engineering catalog. It lists the standard sizes of Kaydon needle rollers and includes design specifications and formulae for calculating applications. Charts present capacity and life factors for the rollers, as well as speed factors. They're available from stock in three types — spherical, conical, and flat ends. Get Catalog 61 from The Kaydon Engineering Corp., Muskegon, Mich., or — **Circle Inform-A-Gram No. B65.**

For Cleaning Work, including castings, forgings, heat treated parts, weldments, stampings, etc., use a table-top airless blast cleaning machine. The rotating Wheelabrator Plain Table is available in 6', 8', 10', or 12' dia. with half inside and half outside the blasting zone. Bulletin 100-D from Wheelabrator Corp., 1183 S. Byrkit St., Mishawaka, Ind., contains complete information on this machine. **Inform-A-Gram No. B66.**

Red Ring Gear Shaving Machines, gear inspection equipment, gear lapping machines, gear grinding machines, self-contained broaching fixtures, and broaches are presented in a new catalog. One section is devoted to illustrations and descriptions of new machines and equipment. National Broach & Machine Co., 5600 St. Jean Ave., Detroit 13, will supply copies of Catalog AP55-8, or — **Circle Inform-A-Gram No. B67.**

Two Sizes of Landis centerless grinders, No. 12 and No. 12½, are covered in a 26-page catalog. The illustrations present applications and automation ideas for centerless grinders in addition to explaining



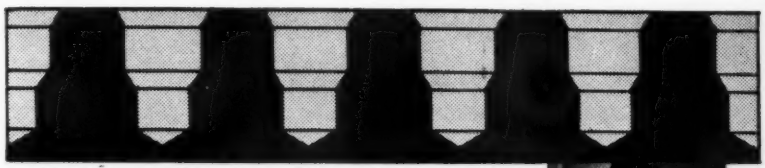
their features. Also included are specifications and extra equipment. Copies of Catalog T-55 are available from Landis Tool Co., Waynesboro, Pa., or — **Inform-A-Gram No. B68.**

Compact, Dependable, Faster Cycling Automatic Cam Feed Drill Units have been developed. They insure positive accuracy on long run jobs. A new type multiple disc electric clutch engages and disengages the feed train from the spindle drive. Two models are available—Model 18-350 and 18-400. Complete information is in single page Flyer 503 from The Hartford Special Machinery Co., Machine Tool Div'n, Hartford 12, Conn., or — **No. B69.**

A 90% Savings in Setup Time is realized with the Aloris "quick change" tool post and tool holders. The tool post which fits all engine and turret lathes, is used for production and short runs, maintenance, and tool and die work. A folder from Aloris Tool Co., Inc., 131-37 Sanford Ave., Flushing 55, N. Y., lists and describes the company's complete line. **Circle No. B70.**

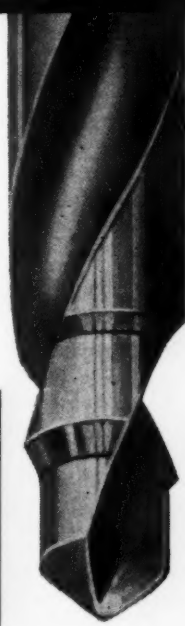
"The Reliable Story" contains facts about the manufacturing methods, facilities, processes, ranges, and applications of springs in modern manufacturing. Suggestions on the selection of spring sources are given and quality control procedures described. The Reliable Spring and Wire Forms Co., 3167 Fulton Rd., Cleveland 9, or — **Circle No. B71.**

ASEA Jig Boring Machines, Types SJ and SJB, are covered in a 7-page illustrated data sheet. Included are general description, specifications, detailed drawings, and information on available accessories. Copies are available from Homestrand, Inc., 9 Addison St., Larchmont, N. Y., or — **Circle Inform-A-Gram No. B72.**



HOW MANY HOLES BEFORE THIS STEP DRILL HAS TO BE RESHARPENED AGAIN?

100 pieces per sharpening or 200—it all depends on the quality of the sharpening job you do. R-O form relief leaves metal behind the edge to support it and dissipate heat. The edge stands up twice as long, the tool lasts twice as long and production costs drop correspondingly.



RO
UNIVERSAL FORM RELIEVING FIXTURE

Produces radial or axial relief only or any combination of the two on taps, step drills, profile mills, reamers, etc. Operation has been completely simplified. For maximum versatility use with the R-O Grinder.

Write for literature

GRINDER DIVISION
ROYAL OAK TOOL & MACHINE CO.
29800 STEPHENSON HY. ROYAL OAK, MICH.

CIRCLE INFORM-A-GRAM KEY NO. 1171

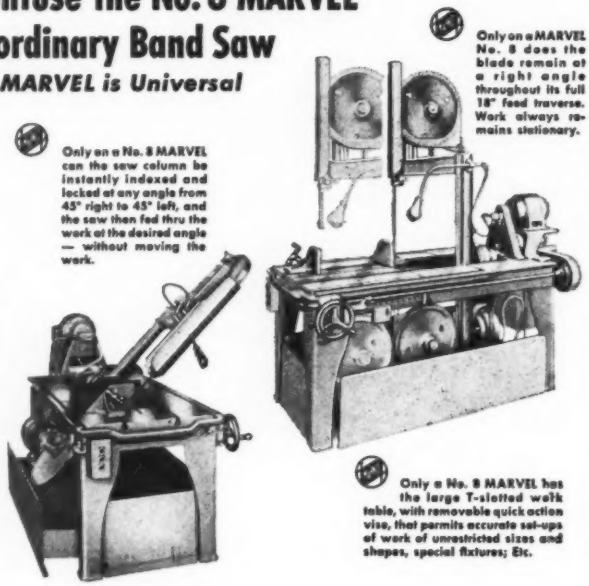
Feed Rates can be set accurately with a feed rate indicator. It gives readings of feed rates from 0 to 50 ipm. The portable, battery-operated unit is designed for hard-to-get-at places. For Bulletin 555 containing details on the indicator, contact National Automatic Tool Co., Inc., Richmond, Ind., or — **Circle No. B73.**

Eliminate Work Spoilage, stripped threads, sheared fasteners, and loose assemblies with "Magnamatic" screwdrivers and nut runners. The "one-shot" clutch controls torque and requires no readjustment. A booklet presents actual case studies of "Magnamatics" in use. For Booklet SP-3165, contact Chicago Pneumatic Tool Co., 6 E. 44th St., New York 17. **Circle No. B74.**

A Work-Transfer Machine that automatically moves large sheet metal panels between presses is described in a bulletin issued by Sahlin Engineering Co., Inc., P.O. Box 289, Birmingham, Mich. Its operation is explained in drawings. Illustrations of its use on a fender skirt and a roof press line are also given. **Circle Inform-A-Gram No. B75.**

Never Confuse the No. 8 MARVEL with an ordinary Band Saw

...only the MARVEL is Universal



Only on a No. 8 MARVEL can the saw column be instantly indexed and locked at any angle from 45° right to 45° left, and the saw then fed thru the work at the desired angle — without moving the work.

Only on a MARVEL No. 8 does the blade remain at a right angle throughout its full 18" feed traverse. Work always remains stationary.

Only a No. 8 MARVEL can do all of these things: Snip-off a ½" rod or cut-off an 18" x 18" cross section.

Rough to Size and Shape

Miter

Index

cut off and shape Structural Beams

Only a No. 8 MARVEL has the large T-slotted work table, with removable quick action vise, that permits accurate set-ups of work of unrestricted sizes and shapes, special fixtures; Etc.

"Rough Machine" to size and shape with minimun chip waste

The No. 8 MARVEL is the "busiest tool in the shop" wherever installed because it is a *universal* tool—has both the capacity and the versatility to handle not only standard sawing jobs but innumerable "trick" and convenience jobs as well. More than a metal saw, the No. 8 MARVEL is a fine machine tool with machine tool features like: Both power and hand feeds; Depth Stops; Automatic Blade Tension; Built-in Coolant Pump; Three operating speeds (or six with 2-speed motor). Moisture-proof electrical controls that conform to both "J.I.C." and "MACHINE TOOL" electrical standards; Dirt-proof ball bearings, etc.

If you cut, machine or fabricate metal, this is a sawing machine you should know about. Write for catalog.

MARVEL Metal Cutting SAWS
Better Machines—Better Blades

ARMSTRONG-BLUM MFG. CO. • 5700 West Bloomingdale Avenue • Chicago 39, U.S.A.

CIRCLE INFORM-A-GRAM KEY NO. 1181

Cold-Form Splines, Serrations, and similar toothed and grooved forms using Roto-Flo "chipless machinery" machines. The three standard sizes now available are covered in a new bulletin. In addition, examples of the machines in action and photos of parts formed on them are shown. Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, will supply copies of Bulletin RF-55, or — **Circle Inform-A-Gram No. B76.**

Press Room Equipment is the subject of a new catalog from Durant Tool Supply Co., 136 S. Water St., Providence, R. I. Included, among other things, are friction type roll

feeds, stock straighteners, scrap choppers, coil cradles, and foot presses. An illustrated explanation of each piece of equipment is given. **Circle Inform-A-Gram No. B77.**

More Profitable Operation is possible with Model 4-U automatic turret lathe. It's designed for fast, accurate metal removal on the toughest alloys. It features a steel weldment bed; 6-face turret; extra large control drum; and rigid, precision spindle. Read all about it in Bulletin 158 supplied by Potter & Johnston Co. (subsidiary of Pratt & Whitney Co., Inc.), Pawtucket, R. I., or — **Circle Inform-A-Gram No. B78.**

High Production at Low Per-Unit Costs is possible with Ferracute punching presses. They can be adapted to many punching, forming, or blanking operations. The 150- and 200-ton models have friction clutches. Specifications and details on these two models are given in Catalog P-400 from Ferracute Machine Co., Bridgeton, N. J., or — **Circle Inform-A-Gram No. B79.**

A Portable, Bench-Type Winder Drive handles field, mush, and armature coils up to 5 hp, as well as solenoid, electromagnet, and other small coils. The clutch and brake on this three-speed winder are controlled in one operation. Read all about it in Flyer 510 from Crown Industrial Products Co., 1355 Amsterdam St., Woodstock, Ill., or — **Circle No. B80.**

Appointment of three sales engineers for Kinney Mfg. Div'n of The New York Air Brake Co. has been announced. **Arthur J. Shivers, Jr.,** will represent Kinney in the Philadelphia area; **Jackson A. Brower,** New York district; and **Thomas A. Sowin,** Chicago district.

◆

Floyd B. Hagenbuch has been promoted to sales manager of Wells Mfg. Corp., and **E. H. VanLoo** to service manager.

◆

Norman W. Calkins is the new assistant manager of tool steel sales and assistant to the vice president of Universal-Cyclops Steel Corp. He will have his headquarters in Titusville, Pa.

◆

Burton G. Ebbeson, has been appointed district sales engineer for the New England district of Norton Co. He'll be responsible for the field engineers and grain engineers in the territory.

◆

Albert G. Jacobs will be a representative for tool bit and drill sales relations of Vanadium-Alloys Steel Co.

◆

R. J. Murphy has been appointed sales manager of the Hydreco and Dudco Div'ns of The New York Air Brake Co. His headquarters will be in Cleveland.

◆

Loren A. Patrick has joined the Los Angeles sales staff of F. J. Stokes Machine Co., as sales engineer. The announcement was made by **Ray Anderson,** district manager.

◆

William Spangler will head the newly established Kansas City sales office and **M. H. Eberle** will be sales engineer at the Chicago office of Resistoflex Corp.

◆

Butler C. Brewen will be the exclusive sales representative in the Detroit area for Everede Tool Co. He has had eight years experience selling tungsten carbide cutting tools.

◆

Theodore L. Theodorff will take over as district sales manager for the Detroit office of the Hamilton Press Div'n of Baldwin-Lima-Hamilton Corp. He has been with the company for 17 years.

The appointment of **A. S. Chivers** as sales manager of Barry Controls, Inc. was announced by **Edward A. Johnson,** vice president in charge of sales.

◆

Allen B. Hughes will be an abrasive engineer for eastern Pennsylvania, Maryland, Virginia, and Washington, D. C., for Bay State Abrasive Products Co.

◆

A. C. Erhardt Jr., has been named director of sales for National Tool Co. He will succeed **Joseph B. Clough.**

Stephen V. Swiatek has been promoted to national sales and advertising manager of Diamond Machine Tool Co.

◆

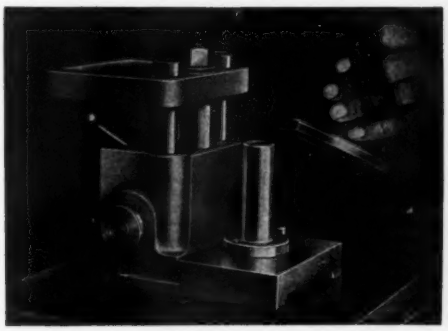
Jack D. Urban will be the new agent for Lovejoy Tool Co., Inc., covering the north central Ohio and Cleveland area.

◆

Barnabus P. Toth has been named sales engineer of Hamilton Mfg. Co. He has been active in the screw machine tool and die manufacturing field for many years.

BIG SAVINGS *in* PRODUCTION TIME
***...and* INCREASED ACCURACY!**

...yours with the
New A·B·C
LIFT SWING
Drill Jig
FIXTURE



The PATENTED "Swing Away" Top Plate can be moved completely out of the way, permitting faster loading, easier nesting, ready inspection of the part, simplified and easier unloading.

Placed over the work in locking position, the Top Plate is aligned in the same way as a precision Die Set, by means of two hardened and ground bushings which glide over immovable, precision ground guide pins. There is no play to permit inaccurate registry.

***A positive and simple locking mechanism* locks the fixture securely, with a slight pressure on the handle. The same slight pressure releases the top plate and raises it to swing position.**

***Drill in TWO places* — The Lift Swing feature can be laid on its back to perform drilling operations in *second* plane, 90° from that of the original drilling.**

***"Impossible holes" become possible* — Using a *double* top plate which can be swung a full 180°, you can drill two holes side by side with a minimum wall thickness between and without regard to the wall thickness of the drill jig bushings themselves. Also, you can drill a smaller or larger hole without removing the piece from the fixture. You simply drill, lift, swing plate — then lock and drill again.**

Write for Color Circular L. S., which gives detailed engineering information, diagrams, range of plate and fixture sizes, etc. Demonstration in your own plant may be arranged. No obligation.

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CIRCLE INFORM-A-GRAM KEY NO. 1191

MEN YOU SHOULD KNOW

Two promotions were announced recently by The Timken Roller Bearing Co. **Ralph W. Updegraff** will serve as the company's chief industrial engineer. **Ross Russell** will be the divisional industrial engineer of the Steel and Tube Div'n.

◆

Atlantic Compound Co. has named **William R. McFarland** as president and general manager. He'll direct a program of expanding production facilities to meet the demand for greaseless polishing and buffing compounds.

◆

J. S. Gillespie, formerly manager of product planning, was appointed manager of the newly organized diamond project section of Carboloy Dept. of General Electric Co. He'll be responsible for putting laboratory techniques of making man-made industrial diamonds into practical production methods.

◆

Dr. John C. Hamaker will head the research on new alloy tool steel development for Vanadium-Alloys Steel Co. The new manager of the company's Powder Metallurgy Dept. will be **William L. Batten.** Both appointments were announced by **Dr. George A Roberts,** vice president of technology.

◆

William R. Alexander has been appointed director of engineering of The Steel Products Engineering Co. of Springfield, O. Formerly the assistant director, he replaces **D. L. Getz** who resigned.

◆

Appointment of **K. O. William Sandberg** as manager of the custom-molding plant of General Electric Plastics Dept. in Decatur, Ill., was announced by **J. L. McMurphy,** department general manager.

◆

John Cameron has been named assistant chief engineer, Hamilton Mechanical Presses, Hamilton Div'n, Baldwin-Lima-Hamilton Corp. He was formerly with Clearing Machine Co.

◆

Warren L. Hardy has been appointed business research manager by Norton Co. He succeeds **Myron N. Smith** who retired after 40 years with the company.

◆

William E. Hibbard has joined Superweld Corp., as application engineer, according to an announcement by **R. E. Jones,** president. A rated welding engineer, he has had more than 20 years experience in mechanical and metallurgical engineering. Mr. Hibbard formerly was with Fabriform Metals.

◆

Clement Ratke has been appointed vice president in charge of engineering for Beaver Tool and Engineering Corp. He has had long experience in the design and engineering of machine tool accessories.

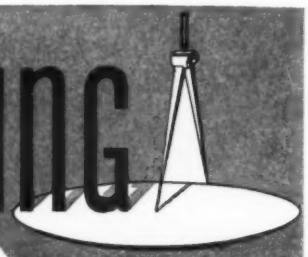
◆

J. W. Elliott was elected vice president of Brubaker Tool Corp. He'll continue to serve as general manager of a subsidiary corporation, Morton Machine Works, which is housed in the same plant with Brubaker.

◆

According to an announcement by **Philip M. McKenna,** president of Kennametal Inc., **George J. Heideman** has been elected treasurer and **Charles R. Van Norden,** secretary, of the firm. **George T. Kearns** who died recently, had served in both capacities.

to economize
STANDARDIZE *with* **RING**



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Ring Standardized Punches and Dies offer cost saving dependable performance for all of your perforating problems.

Precision volume production to rigid specifications offers

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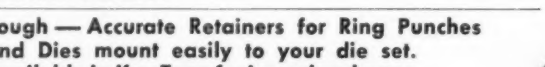

Blanks — Pilots — Headless — Shoulder and Bevel Head Quills — Slug Ejector Punches — Transfer Punches

NEW! **Tough — Accurate Retainers for Ring Punches and Dies mount easily to your die set. Available in Key Type for irregular shapes.**

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Gentlemen: Please send me a copy of your new, complete CATALOG #104 at once.

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CIRCLE INFORM-A-GRAM KEY NO. 1201

MEN YOU SHOULD KNOW

Lee F. Desmond, assistant to the president of Dodge Div'n, Chrysler Corp., has been promoted to vice president of Dodge. **Byron J. Nichols** will take over as vice president and general sales manager.

◆

The new vice president in charge of engineering of Kearney & Trecker Corp. is **Orrin W. Barker.** He'll succeed **Joseph B. Armitage** who will continue as vice president-consultant.

◆

William N. Rathbun has become plant facilities engineer for TEMCO Aircraft Corp. **James F. Parrish** will succeed him as chief industrial engineer.

◆

William M. Burr will head the new Aircraft and Missile Section of Control Engineering Co. He has had 15 years of test facilities experience.

◆

Allen W. Salzman has joined the Waukesha Tool Co. as chief engineer. In addition, he'll head the firm's new Thrust Bearing Div'n.

◆

Neil E. Geisler has been promoted to chief production engineer for Geuder, Paeschke & Frey Co.

◆

G. R. McWane has joined American Crucible Products Co., as plant engineer. One of his first projects will be the new building layout for the firm's Kenco Pump Div'n.

◆

As part of an expansion program in the special precision balls and bearings field, Industrial Tectonics, Inc., has named **Kenneth W. McKenzie** as sales manager. **Gerald L. Buhrman** will take over as plant manager in charge of all manufacturing operations.

◆

The names of two new vice presidents of Pratt & Whitney Co., Inc., have been disclosed. They are **Jacob J. Jaeger** and **Albert L. Knapp.**

◆

James F. Donnelly has rejoined A. O. Smith Corp. as special assistant to **F. S. Cornell,** vice president and general manager. For the last three years he has been a vice president of Servel, Inc.

◆

Rear Admiral Harry B. Temple will be assistant vice president of Robertshaw-Fulton Controls Co., according to an announcement by **John A. Robertshaw,** president. He'll be located in the Washington, D. C. offices, and be concerned with the company's expanding interests in atomic energy.

Two appointments have been disclosed by Kinney Mfg. Div'n of The New York Air Brake Co. **W. H. Crowley** will take over as chief engineer and **J. Raymond Marshall** as equipment sales engineer.

◆

Sylvester J. Thrasher will serve as manager of the transmission plant, Chevrolet Motor Div'n, General Motors Corp., in Saginaw. He had been general superintendent of production there.

Norman A. Price has been named vice president and a director of The Colson Corp. The announcement was made by **Robert A. Pritzker,** president.

◆

W. W. Greenway, vice president and general manager of Axelson Mfg. Co., has announced the appointment of **Roy C. Heacock** as director of engineering. Mr. Heacock has been with Barber-Green Co. for the past eight years.

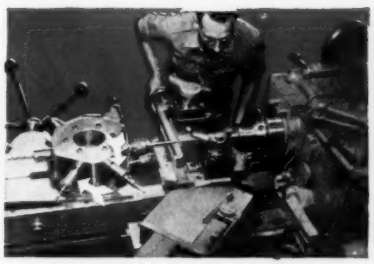
SCULLY JONES

"Precision Holding" Tools reduce costs, increase production in many machine tool applications

"Precision Holding" solves diversified tooling problems on Gisholt Turret Lathe

This Gisholt Ram Type Turret Lathe is equipped with nine different Scully-Jones "Precision Holding" Tools (for two setups). It performs eleven different operations on the pilot and shank ends of Scully-Jones Shell End Mill Arbors.

You can take full advantage of turret lathe accuracy and capacity by using Scully-Jones Holders. Tooling costs will be reduced, the job will be easier, and production will increase. Your Scully-Jones representative can help you select the correct tools for every operation.

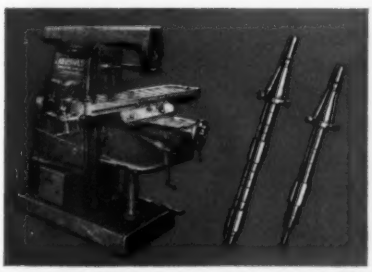


Greaves No. 2H Plain Milling Machines "factory-equipped" with Scully-Jones Arbors

On heavy slabbing cuts, every tooth in the cutter must take its share of the load. That's why Greaves engineers specify Scully-Jones Style "B" Precision Built Arbors which prolong tool life by eliminating runout, wobble, and chatter when milling at maximum feeds and speeds. Arbor and pilot diameters are held to —.0005 in. Faces of spacers and sleeves are ground and lapped parallel within .0002 in. Write for bulletin 2-50.

Quick-Change Chucks save waste motions—speed tool changes on Tinius Olsen Balancer

While part rotates at 600 rpm, this Tinius Olsen Balancing Machine locates and measures the unbalance automatically, and corrects it by removing metal from the counterweights. Scully-Jones Quick-Change Chucks on all four spindles drive the drills and simplify tool changes. These Chucks allow instant replacement of tools for sequence operations. There's no waste motion, or idle machine time. Write for Bulletin 3-50.



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"Precision Holding" for holding precision

Call your Scully-Jones representative or distributor—factory-trained "Precision Tool and Work Holding Specialist"—for information and service.

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CIRCLE INFORM-A-GRAM KEY NO. 1211

GROWING PAINS

Walter P. Hill, Inc. is building an addition to its Detroit plant that will almost double the present capacity.

A multi-million dollar expansion program will result in a 40 percent increase in automotive chassis frame production capacity for Parish Pressed Steel Division plant of **Dana Corporation.** The program involves the construction of two additions to the present plant in Reading, Pa.

◆

Biddle Screw Products Company has announced the completion of increased plant facilities for screw machine production in Sheridan, Ind. The expansion program involved more than $250,000.

Federal Products Corporation has occupied a four-story building which increases its manufacturing space by 24,000 sq. ft. The company produces precision instruments for dimensional control.

◆

Chrysler Corporation will build one of the world's largest metal stamping and fabricating plants at Macedonia, O. The plant covering 1,500,000 sq. ft., and the equipment were valued at $85,000,000 by L. L. Colbert, Chrysler president.

◆

The West Coast Division of **H & B American Machine Company, Inc.** will gain a 100 percent increase in capacity when it moves into a new plant in Culver City, Calif.

◆

Monsanto Chemical Company, the largest U. S. producer of phthalate esters (plasticizers), is increasing production and storage facilities at its plant in Everett, Mass. They'll be completed before the end of the year.

◆

A $4,400,000 expansion program at **Kankakee Works** of **A. O. Smith Corporation** will add 270,000 sq. ft. of manufacturing and storage space to increase the present area by over 50 percent.

◆

Barry Controls Inc., manufacturers of shock and vibration isolation equipment, has started a $300,000 expansion of facilities. The program will consist of the building of a two-story structure covering 24,000 sq. ft. and the renovation of the present Barry building.

◆

Aerobilt Bodies, Inc., a subsidiary of **Grumman Aircraft Engineering Corporation,** Bethpage, N. Y., has opened a new $350,000 plant in West Athens, N. Y. This factory will produce Grumman truck and trailer bodies.

◆

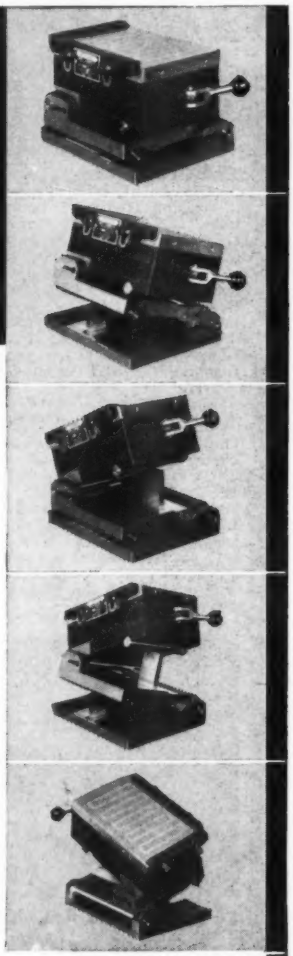
West Instrument Corporation, manufacturer of control equipment and accessories, has moved its Chicago factory into a new building. The new structure provides over 12,000 sq. ft. on one floor with provisions for expansion.

◆

Construction of a reduction plant at The Dalles, Ore., will begin early next year, according to an announcement by Leo M. Harvey, president of **Harvey Machine Company** and **Harvey Aluminum.** Annual capacity of the new plant which will make Harvey the nation's fifth producer of primary aluminum, will be 108 million lbs.

Industry's most versatile Magnetic Chuck

MAGNA-SINE



Here is a magnetic chuck that not only handles your parallel work but angular work, too. And angular set-ups to gauge block accuracy take but a matter of minutes!

Any angle—single or compound—is set up by inserting gauge blocks between the Magna-Sine's precision hinged base plates. Correct blocks to use are indicated in Table of Constants provided. Hours of set-up time are saved, angular accuracy is positive, work is held distortion-free on permanent magnet chuck.

Thousands in use for grinding, inspection, drilling, boring.
Write for free catalog which shows all styles and sizes . . . price list included.

OMER E. Robbins COMPANY

Dept. C-2, 24800 PLYMOUTH RD. • DETROIT 39, MICHIGAN

Also producers of special gauges and fixtures

CIRCLE INFORM-A-GRAM KEY NO. 1221

NOTCH THESE ENDS WITH ONE STROKE OF PUNCH PRESS

ARC-FIT TWIN-NOTCH

NO DEFORMATION Shears from inside out—cuts clean edges; eliminates need for further finishing; aligns notches automatically.

PERFECT "T" Joints for welding or brazing.

PRODUCTION NOTCHING Actual production time per pipe or tube end reduced to less than 3 seconds.

INTERCHANGEABLE Punches and dies up to 2⅜" O.D. pipe or tube for STANDARD TWIN NOTCH. (Special units available up to 3" O.D.)

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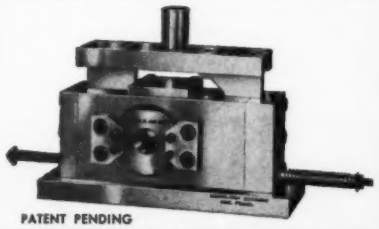

PATENT PENDING

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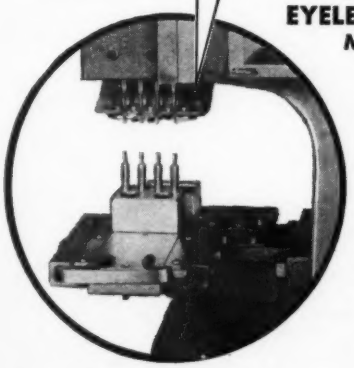
CIRCLE INFORM-A-GRAM KEY NO. 1231

IF YOUR ASSEMBLY REQUIRES MORE THAN ONE EYELET...

Eliminate those extra handling operations!

Edward Segal

AUTOMATIC EYELET ATTACHING MACHINERY



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Eyeleting machinery, special hoppers & feeding devices

CIRCLE INFORM-A-GRAM KEY NO. 1232

Identical Twins

Republics consistent good quality gives nature a run for it's money!

Confidence that every spec will be closely adhered to – that the next gage will be just as perfect as the last—consistency in quality – this is the important thing that appeals to quality control men and the reason so many of them regularly specify Republic.

- Thread Plugs and Rings
- Plain Plugs and Rings
- Pipe Plugs and Rings
- Reversible thread and plain plugs
- Measuring wires
- Thredmasters

COMPLETE ORDERING DATA

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by reducing set-up time as much as 90%

With Jig Boring Accuracy

ADVANCE CROSS-SLIDE ROTARY TABLE

*Proved by actual on-the-job performance

permits fast, precise positioning of work-piece from ONE SET-UP. No unclamping and reclamping on your standard vertical mill equipped with ADVANCE Cross-Slide Rotary Table. Only your milling machine's table movement limits the size radius you can cut.

Ideal for tools, dies, jigs, fixtures, gauges, patterns, molds, cams, templates, models and experimental work. Write for specifications and literature today.

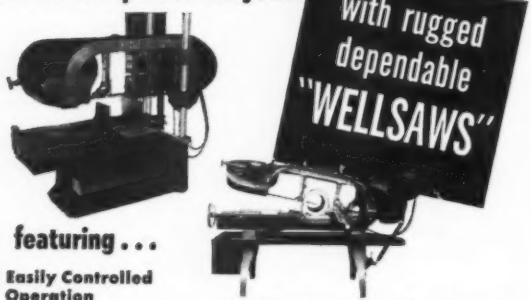
MORRISON ENGINEERING COMPANY

937 West Lake Street, Dept. A, Chicago 7, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 1241

METAL "CUT-OFF" becomes a preferred job...

with rugged dependable "WELLSAWS"



featuring . . .

- Easily Controlled Operation
- Fast, Accurate Action
- High Job Productivity
- Low Operating Cost
- Long, Dependable Service

• Production, or utility "cut-off" work in your shop becomes a *Preferred Job* with a Wells Horizontal Metal Cutting Band Saw, because the *operation* is so *easy to control.* Even in the hands of the "new guy," a Wells Band Saw can be counted on to *Reduce* your *Production Costs,* through greater efficiency, more accurate cutting and real dependable service.

Call your Wells Distributor, or write for *Job-Engineering Service.*

Wells

The Pioneers of Horizontal

METAL CUTTING BAND SAWS

WELLS MANUFACTURING CORP.

1940 CEDAR ST., THREE RIVERS, MICH.

CIRCLE INFORM-A-GRAM KEY NO. 1242

THE VISE WITH A THOUSAND GRIPS

'FLEXIBLE JAWS' GRIP ANY SHAPE!

Positive grip vise. Grips any irregular shape. Grips secure and positive for the most precise milling, drilling or cutting operation. Eliminate the time and expense of blocking and shimming irregular pieces for toolroom machining. Try it in your shop. Save time and dollars on small production runs. Write for complete information now.

Applicable on any machine tool.

AMPOGRIP CONTOUR GRIPPING UNIVERSAL FIXTURES

AMERICAN POSITIVE GRIP VISE CORP.

1-M OLIVINE STREET • WILLIMANSETT, MASS.

CIRCLE INFORM-A-GRAM KEY NO. 1243

Faster, Better, Less Expensive . . .

MARKING

with job designed

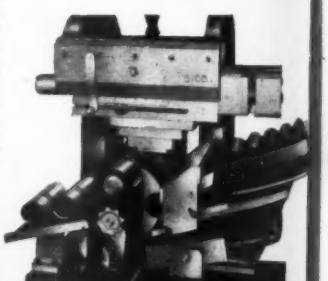
GEO. T. SCHMIDT

Production Marking Machines

The fully automatic, hydraulically - operated tube marker shown here was designed by GTS engineers for major automotive manufacturers.

The units roll a trademark and part number on 2500 to 3000 mild steel thin-walled tubes per hour — a speed that cuts cost per impression to the bone. Hydraulic control keeps all impressions clean, accurate, and of precisely the same depth.

Have a GTS Sales Engineer call on you, without obligation, to discuss how modern marking methods can save costs and speed production in your operation.



GEO. T. SCHMIDT, INC.

4112 Ravenswood Avenue

Chicago 13, Illinois

IF IT'S WORTH MAKING, IT'S WORTH MARKING

CIRCLE INFORM-A-GRAM KEY NO. 1244

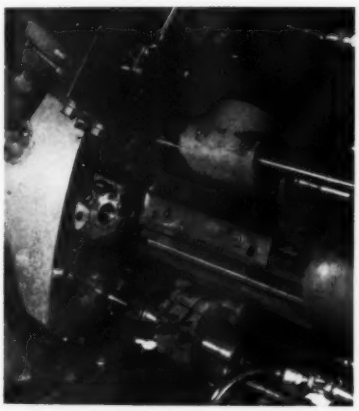
Tool Life Jumped on Interrupted Cast Iron Facing

Tool life jumped 400% recently on an interrupted facing operation on a cast iron valve body by switching from cast iron cutting carbides to the new Wessonmetal 26 steel cutting grade at Lakeshore Div., Bendix Aviation Corp., St. Joseph, Mich.

With the cast iron grades previously used, tool life attained a maximum of only 1360 pcs/grind. This has been increased to 5440 pcs/grind with the 26 Grade, despite the fact this grade was designed primarily for steel cutting operations.

Total number of pieces produced per insert with former carbides were limited to 16,320, while Grade 26 has increased this to an average of 65,280 pcs/insert.

It is believed the temperatures generated at the tool-chip interface on this operation, which is running at 350 sfpm, accounted for the combination of severe crater and abrasive wear of the cast iron grades. This condition required excessive stock removal in regrinding the tool cutting edges.



The steel cutting Grade 26 with inherently high red hardness and extreme edge strength, making it suitable for machining at high and low surface speeds, has overcome the crater-wear problem on this operation.

The part machined is a 4½" dia. gray iron valve body with lugs on the OD, and all operations are being performed on an 8-spindle Acme-Gridley Chucker with the interrupted facing cut being made at Station # 3.

The interrupted cut is being made at .0103" feed and .050" depth of cut. The tool used in the operation is a standard band-type Multicut equipped with a built-in flush gage for simplified insert setup in the machine.

Abrasive Names Sceeles, Vinbury to New Posts

Joseph T. Vinbury, formerly in charge of advertising and sales promotion for The New Britain Machine Co., has succeeded Walter P. R. Sceeles as Sales Manager of Abrasive Machine Tool Co., E. Providence., R. I., manufacturers of precision grinding machines.

Mr. Sceeles, now Assistant to the President, serves as senior administrative and sales advisor. He has been with Abrasive for 32 years.

A member of the Advertising and Market Research Committee of the National Machine Tool Builders' Association for the past six years and Committee chairman for the past three years, Mr. Vinbury is in charge of Abrasive's advertising, sales promotion, and marketing. He is a Past-President and National Director of the National Industrial Advertisers Association and in 1950 was recipient of the $1000 Industrial Press Award.

END MILL SPECIALISTS
and What it...
...Means to YOU...
HIGH SPEED
TWO FLUTE
THREE FLUTE
FOUR FLUTE
LONG LIFE
The major portion of production at Melin Tool Company is devoted to End Mills. When you specify MELIN...you know your order is receiving personal attention. There are no priorities in other divisions.
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MELIN TOOL CO. INC.
Representatives in Principal Cities
MELIN TOOL COMPANY, INC.
3371 West 140th St., Cleveland 11, Ohio

CIRCLE INFORM-A-GRAM KEY NO. 1251

Adding Utility to Horizontal Mill by Attachments

Converting the horizontal milling machine into a more versatile machine tool can be accomplished by the use of several new attachments and accessories developed recently by The Greaves Machine Tool Division, J. A. Fay & Egan Company, Cincinnati, Ohio.

One is a vertical heavy-duty attachment, Figure 1, that mounts directly on the column of the Greaves horizontal mill, thus permitting all types of vertical milling operations to be performed. For shops doing both kinds of operations, the unit provides a low cost method of providing for vertical operations.

The unit has an extra heavy head, with the spindle mounted in Timken roller bearings. For convenience and ease of operation, the attachment spindle has a No. 50 N.S. taper, same as in the Greaves horizontal milling machine. Arbors, collets and adaptors used on the machine may also be used in the vertical attachment.

The attachment head housing is graduated, and swivels to permit rotation of the head. The cutter may be set at any position through 360°, and is positively locked by four equi-distant clamping bolts.

The spindle speed of the attachment is at 1:1 ratio to the spindle speed of the Greaves mill, simplifying the calculation of cutting speeds.

Another attachment, Figure 2, is similar in specifications to the one described above. Known as the heavy-duty offset vertical milling attachment, it provides 4½" additional vertical clearance through utilization of an offset head on the attachment. Gearing is provided to permit mounting of the vertical spindle higher than the point of drive.

ARMSTRONG

SET-UP and HOLD-DOWN TOOLS

ARMSTRONG Set-up and Hold-down Tools reduce setting-up time—keep men and machines producing. Designed for use on planers, drill presses, milling machines, etc., they hold work securely and rigidly, and thereby reduce spoilage and prevent costly accidents.

Your local Armstrong Distributor carries ARMSTRONG Set-up and Hold-down Tools in stock in sizes for every operation. Stop haphazard setting-up methods. Provide each of your machines with a full complement of ARMSTRONG Set-up and Hold-down Tools.

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ARMSTRONG BROS. TOOL CO.
"The Tool Holder People"
5220 W. Armstrong Ave., Chicago 30, U. S. A.

PLANER JACKS

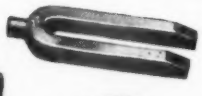
NON-SKID JACKS

STEP BLOCK

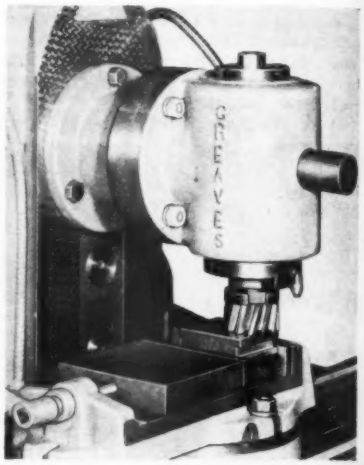
UNIVERSAL CLAMP

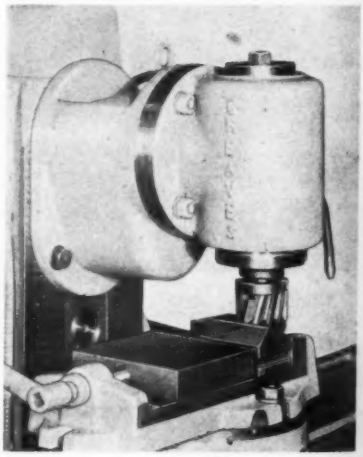
T-SLOT BOLTS AND NUTS

T-SLOT CLAMP


STRAP CLAMPS

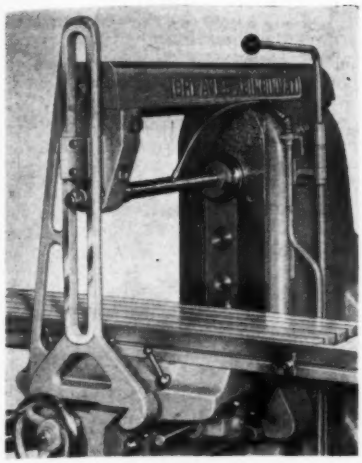
CIRCLE INFORM-A-GRAM KEY NO. 1261





One of the accessories, Figure 3, is a heavy-duty overarm brace, designed for mounting on the Greaves horizontal mill, which provides extra arbor support for work involving heavy slab milling or extra-heavy cuts, and for maximum precision on close tolerance milling.

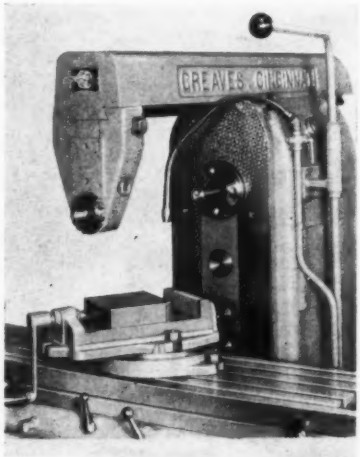
The brace is completely adjustable to the travel limits of the machine. It is quickly and easily attached and provides rigidity by tying the overarm to the knee for minimum spring and vibration in the arbor.



The second accessory, Figure 4, a heavy-duty swivel-base vise, may be used for holding all types of small workpieces. The unit has exceptionally low height to provide maximum vertical clearance.

The vise base is graduated through 180° from a master index plate, and provides any angle in a horizontal plane required in milling operations. The vise may be easily removed from the base and used as a plain vise.

Other features include removable hardened alloy tool steel jaw facings, and milled keyways for alignment of the vise to the milling table.



Printed pressure sensitive tapes serve as danger and warning signals. Two of the most popular tape materials are "flat back" and colored acetate. Manufactured by Labelon Tape Co., Inc., they'll stick to wood, metal, glass, tile, plastic, etc., and are available in a variety of colors.

PUNCHED TAPE CONTROL SYSTEM

A new, highly compact punched tape control system called Binotrol, with wide practical applications for automatic operation of machine tools, valves and other industrial equipment, has been announced by Barnes Engineering Company, Stamford, Conn. It differs from other control devices in several ways. Its simple computer system makes for compact size, the complete control console being no larger than an office desk. Its operating principle is digital-to-analog — the **reverse** of most other systems. It contains few vacuum tubes; the circuitry is composed mainly of reliable, high-quality, dependable telephone-type relays. It is a functioning, practical control system which is relatively inexpensive and simple to operate.

The first use of Binotrol was demonstrated by Jones & Lamson Machine Company, Springfield, Vermont, at the Chicago Machine Tool Show where it operated the Jones & Lamson No. 7 turret lathe completely automatically.

. . . Continued on Next Page

5203-R

IT'S A HAMILTON

INDEED

There is no way under the sun to do small, precision tapping with "production" speed, satisfactory tap life and acceptable accuracy, other than to use a tool designed for the specific purpose.

THE *Hamilton* SUPER-SENSITIVE SMALL HOLE TAPPING MACHINE IS SUCH A TOOL!

WANT ALL THE FACTS

Write for Hamilton Bulletin No. 5203. Address The Hamilton Tool Company, 832 South Ninth Street, Hamilton, Ohio.

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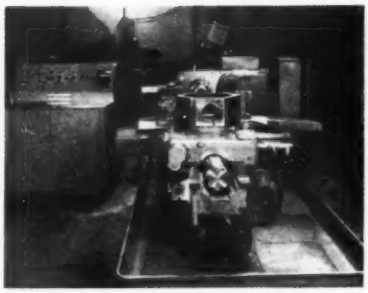
CIRCLE INFORM-A-GRAM KEY NO. 127

In its operation a coded signal, punched on tape, is fed into the machine and the machine moves to a pre-determined spatial position depending, of course, upon the signal.

The machine shown is automatically cycled and provides recti-linear motions with precise controls to the end points. In addition to these commands the tape also controls spindle speed (choice of 32 speeds, 16 in the high range and 16 in the low range at any time); indexing of the six position turret to any face at any time; indexing of four position turret to any face at any time; operation of hydraulic powered collet



chuck and bar feed; turning coolant on or off; opening or closing hood; resetting of tape to repeat cycle.

The tape uses binary number coding for a maximum utilization of tape space. Tools are pre-set to gages for given dimensions.

Because this machine greatly reduces set-up time and the necessity for skilled operators, it is ideal for short run jobs; even making single piece production feasible. On the other hand, the automatic cycle allows full advantage of turret lathe multiple tooling on long runs.

ROLLS ROYCE

turns to PIVOT
HIGH SPEED STEEL
PUNCHES

HOW WOULD YOU SOLVE THIS PROBLEM?

Pierce Nimonic 75 with a series of 96 holes, size .250" on a conical surface.

HERE'S HOW ROLLS-ROYCE LIMITED, Derby, England, long-acknowledged world leader in automotive engineering, solved the problem. For production of a flame tube for gas turbine engines, Rolls-Royce Ltd., turned to Pivot High Speed Steel Punches.

"A substantial improvement in production figures has been obtained as the result of the introduction of Pivot Punches", the manufacturer reports.

The above experience is typical. Pivot high speed steel punches are helping firms all over the world to increase the quality and quantity of their production and decrease their unit costs.

Put Pivot Punches to work for you now. Send for complete catalog on perforating and pilot punches in all shank styles; also punch blanks, retainers and die buttons at list prices! Write Dept. T.P.

pivot punch and die corp.
NORTH TONAWANDA, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 1281

CLAMPED CARBIDE INSERT TOOL SHOWS LONG LIFE

A decisive boost in tool life—33-1/3%—on facing cast stainless steel flanges was recently reported by Midwest Alloy, Inc., of St. Louis, Mo., which used Kennametal's newest general purpose steel cutting material, Grade K21.

A 24" Bullard vertical boring mill was employed in working the Type 316 stainless steel flanges—an operation that required facing over bolt holes in flanges which ranged from 3" to 14" in diameter. The bolt holes presented a severe interrupted cutting problem.

In this operation a clamped insert was used with a Kennametal Style BLH-20 tool. The feed was 0.020"/rev, speed 145 sfpm, and depth of cut 3/32". In one typical operation, a K21 insert was used for 160 hrs.

Of the several carbide grades tested during similar operations, Grade K21 provided the most consistent performance, according to Midwest Alloy. Operating conditions vary only slightly with different size flanges.

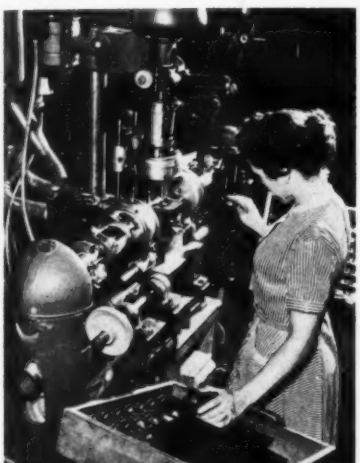
The new steel-cutting grade has a Rockwell A rating of 91.0 and company reports indicate it is ideal for either general cutting, heavy roughing, or finishing. Chief characteristics are high edge-strength, superior wear quality, and excellent resistance to cratering.

Home-Grown Machine Tools Click for Camera Maker

Precision machining camera bodies and a flash attachment posed a problem in engineering economics for Whitehouse Products, Inc., Brooklyn, N. Y. Production requirements were sufficiently large to rule out single drilling of the complex components, but not enough to warrant investment in special machine tools.

Whitehouse technicians met the problem by designing and building its own production machinery. Consisting of nine 14" high speed Delta drill press heads in a multiple-unit arrangement, the drilling setup they planned can be operated either individually or collectively.

Machining the flash attachment, shown in the illustration, calls for three drill press heads to drill eight holes and perform a deburring operation at the same time. Two opposed horizontal drill press heads equipped with three spindles each are used to drill electrical contact and hinge holes on the sides of the unit. At the same time, a vertically-mounted two-



spindle drill press head drills two holes through the flash attachment fastener while it deburrs a 1¼" reflector hole on the flash housing. Production rate is 600 pcs/hr.

In machining the camera bodies, one unit made up of four drill press heads drills 16 holes simultaneously at a rate of 300 pcs/hr. The other unit, used for operations on the back cover of the camera, consists of two drill press heads that automatically drill five holes simultaneously. Production rate for this machining sequence is 450 pcs/hr.

Chart Emphasizes High Cost of Tiny Scale Errors

A small error of an ounce can cost $1,875 in a year at 100 weighings a day of a product valued at a dollar a pound.

This calculation, taken from the "scale error chart" issued jointly by the National Conference on Weights and Measures Education Committee and the National Association of Scale Manufacturers, emphasizes the high cost of even tiny weighing errors when multiplied hundreds of times.

The chart shows the costs of scale errors in both percentages and dollars to refute the commonly held impression that small errors in weighing are of no consequence. With it, for example, workers can readily understand the values of errors in these terms and will be more aware of avoiding even small errors.

The National Association of Scale Manufacturers, Inc., 1 Thomas Circle, N.W., Washington 5, D. C., will answer your requests for copies of the chart.

NOW CUT COST OF PRECISION GEAR PRODUCTION

THIS FEATURE: "Independent selection of speed, feed and indexing," sets the Hamilton Precision Small Gear Hobber apart from the field,

AND ENABLES the users of this machine to vary speed and feed to suit the material being machined.

THIS FACT, and a "reserve of accuracy" built into the machine, work spindle and hob spindle runout of less than .0002" as an example,

CONTRIBUTES to more gear precision with no sacrifice of gear production,

OR INCREASED gear production with no sacrifice of gear precision, ... OR BOTH!

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CIRCLE INFORM-A-GRAM KEY NO. 1291

NEW PROFICORDER RECORDS MAGNIFIED SURFACE PROFILES

The Proficorder, a new mechanical-electronic instrument that provides a magnified chart record of the profile of internal and external machined and finished surfaces has been announced by Micrometrical Development Corporation, 2821 State St., Ann Arbor, Mich.

This instrument records (1) waviness, bows, steps and other widely-spaced irregularities, with surface roughness omitted, (2) roughness irregularities alone, with waviness omitted, or (3) the combined roughness and waviness profile. Selection is made by pushbuttons on the control panel. The charts show the true height and spacing of the surface irregularities, and open up new possibilities in production setup and inspection, quality control, and research and development work. In addition, a meter on the control panel shows the average height of the roughness profile being recorded.

This Proficorder includes a tracer, a pilotor, and an amplicorder. All working parts are mounted on or in a desk-type console, as illustrated. The piece being profiled is placed on the pilotor base plate as shown in Figure 1; the piloting mechanism moves the tracer in a plane parallel to the work surface at .005″/sec, over any desired length of trace from 1/16″ to 1½″.

Fig. 1. The Proficorder in use—recording waviness profile of a turned surface.

The tracer is a differential-transformer-type transducer. It has a stylus with a diamond tip of .0005″ or .0001″ radius which moves along the surface; and the output voltage of the tracer is modulated in accordance with the vertical position of the stylus. This voltage goes to the amplicorder amplifier in the back of the console; and the amplified voltage operates the pen meter of a recorder in the lower drawer of the console, Figure 2, so that the amount of pen movement is proportional to the vertical displacement of the tracer tip. Six vertical magnifications are provided from .000025″ to .0005″ per chart paper division (approximately 10,000x to 500x), and are selected by pushbuttons on the control panel.

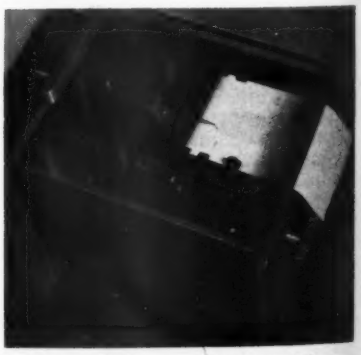

Fig. 2. The recorder, located in a drawer for convenience and protection.

The intermeshing sleeves support the punch throughout its entire length. Result?

1. The Punch CANNOT buckle
2. The Punch CANNOT shift off center
3. Perforates thru metal many times thicker than hole diameter.

All Durable Punches are vertically lapped, then electrocoated — Result—easier stripping, no galling, longer punch life.

Because Durable's research department constantly finds answers to difficult piercing problems—thousands of customers DEPEND ON DURABLE.

WHAT'S YOUR PROBLEM?

Whatever your piercing problem may be — DURABLE'S know-how and 18 years experience offers a quick, economical solution. Write today for full details on any piercing problem. You'll get a fast, practical reply from the most DEPENDABLE Punch and Die Manufacturer in the World!

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CIRCLE INFORM-A-GRAM KEY NO. 1301

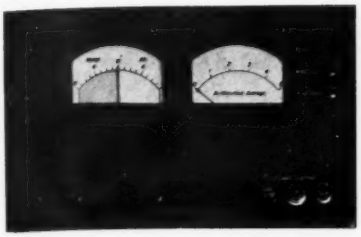


Fig. 3. Pushbutton controls are all located on one convenient control panel, a close-up of which is shown.

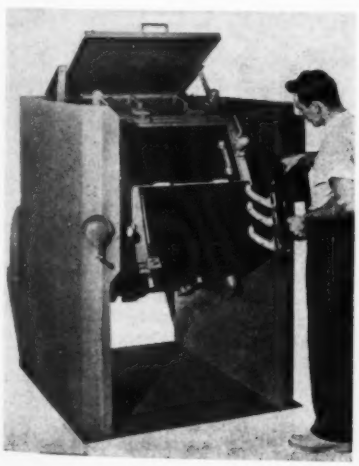
A gear shift lever on the recorder chart drive, Figure 2, provides 7 horizontal magnifications, from .001" to .100" per chart paper division — approximately 500x to 5x.

The pilotor illustrated has a vertical adjustment of 7½" and a tilt adjustment of 5° each side of horizontal. The tracer enters a ⅛"-dia hole to ¼" depth and a 3/16" hole to 1-5/16" depth, and can be used on all external surfaces that can be positioned beneath it on the pilotor base plate. Long-shank diamond holders can be furnished for measuring over shoulders.

For simplicity of operation, the controls consist entirely of pushbuttons, and all are located on one convenient control panel, Figure 3. The control panel also has a set-up meter that facilitates aligning the path of the tracer movement parallel to the surface to be profiled.

Aluminum Castings Coloring Machine

A new eight-door, stationary-fixture, finishing machine is designed primarily for coloring of aluminum castings. Made by Roto-Finish Co. of Kalamazoo, Mich., the machine has a door on each flat of a single compartment cylinder. Fixture attachment pads are mounted on the octagon side walls of the compartment just inside the door opening.



After the grid-type fixture is placed inside the cylinder, it is held in position during the processing operation by pressure of the closed door pushing it firmly against the contoured attachment pads. Parts are held by the grids so as to effectively expose them to the processing media.

One of the outstanding features of the machine is that it is not necessary to remove processing media or solution when removing a work load from the compartment.

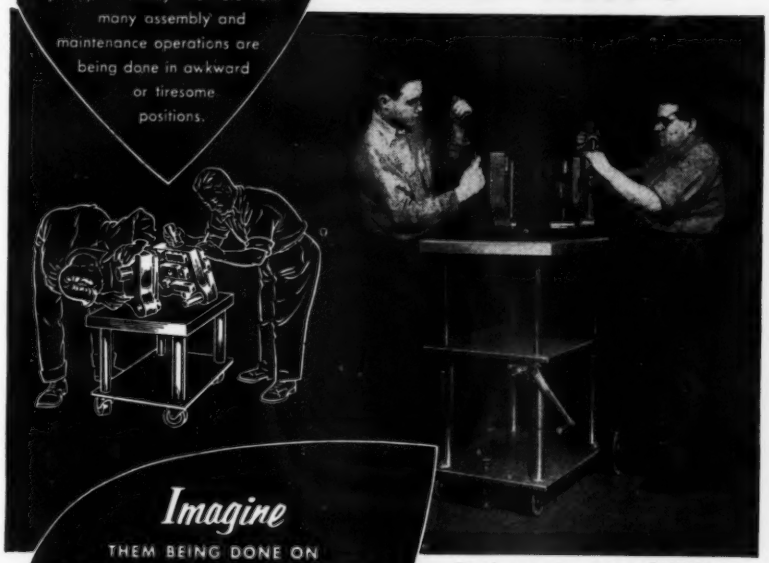
Processing compartments vary in size up to 48" long and 42" in diameter. Most suitable size, according to Roto-Finish, for average processing is a compartment 32" long and 42" in diameter. This size, used for coloring aluminum castings with steel balls, uses a 7½-hp drive equipped with automatic reversing electric controls. The doors are so hinged that rapid servicing of the fixtured parts results in an economical operation.

The machine gives a low cost bright lustrous finish to aluminum tool housings, food choppers and many other castings.

5400

do you
WASTE MONEY
RISK ACCIDENT
doing things the
HARD WAY?

Take a trip through your plant today and note how many assembly and maintenance operations are being done in awkward or tiresome positions.



Imagine THEM BEING DONE ON
PORTELVATOR
THE HANDY HAMILTON PORTABLE ELEVATING TABLE

With Portelvator hundreds of assembly and maintenance jobs are accomplished at the *right height* and in the *best light*. And that means money in the bank and workmen on the job; faster work and fewer accidents.

Portelvator prices start at $155.00—place a couple at your workmen's disposal and watch results.

Complete description in FREE Bulletin No. P-5403.

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CIRCLE INFORM-A-GRAM KEY NO. 1311

• *New Equipment*
• *New Materials*
• *New Literature*

WHAT'S NEW

"Plastics For Chemical Engineering Construction — Polyethylene" discusses its mechanical, electrical, and chemical properties. Typical fabrications and applications of the plastic are illustrated. Tables and charts round out the discussion. American Agile Corp., P.O. Box 168, Bedford, O., will supply copies of the booklet. **Inform-A-Gram No. E1**

A Liquid Plastic has been developed for repairing irregularities in plastic molded cases. ALFIL is also excellent for filling in the area between terminal poles and battery cases. It's transparent; fast-setting; and creates a waterproof seam. Allen Plastics Corp., 1015 E. 173rd St., New York. **Circle Inform-A-Gram No. E2.**

POPE PRECISION SPINDLE

means finer finishes at lower cost

Look at the super precision double row cylindrical roller bearings and separate thrust bearings, an exclusive feature found only in Pope Spindles.

You won't find bearings like these in other makes of spindles.

The bearings and shafts in Pope Spindles have tremendous load carrying capacity for crush dressing and form grinding. They produce superior, low micro-inch finishes, and assure long, trouble-free operation. There can be *no endwise movement of shafts in either direction.* Operation is always cool. Pope System lubrication is good for the life of the bearings.

YOU CAN SPECIFY POPE SPINDLES WITH CONFIDENCE

Write for Catalog 60A covering the complete range from 1 HP to 15 HP in standard Pope Spindles.

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Specify POPE PRECISION SPINDLES

POPE MACHINERY CORPORATION
Established 1920
261 RIVER STREET · HAVERHILL, MASSACHUSETTS

BUILDERS OF THE REVOLUTIONARY NEW POPE SUPER-PRECISION BORING MACHINE THAT BORES HOLES ROUND WITHIN MILLIONTHS OF AN INCH

CIRCLE INFORM-A-GRAM KEY NO. 1321

A New Finish, "Poly-Ep" Platon, can be applied directly to any clean metal surface without a prime coat. It has an extremely hard but flexible surface that won't crack or chip under impact or bending. This polyamide epoxy is a two component fin-

ish that's mixed in equal parts as needed. When applied, it dries dust-free in 30 min. and can be handled in 120 min. Minnesota Platon Corp., Pipestone, Minn., or — **No. E3.**

A Flameless Blow Torch is the "Mamco" heat gun for quick, safe heat up to 750° F. It's used for softening plastic sheets, strips, or parts for further fabrication; preheating small and experimental molds; softening plexiglass windows for fitting; welding or fusing small parts in assembly; and repairing plastic tooling. It features an adjustable air intake for controlling the air blast temperature. Master Appliance Mfg. Co., Bridge and Ontario Sts., Racine, Wis., or — **Circle No. E4.**

Eliminate Open Press Time, reduce rejects, and speed assembly with a new-type, self-locking brass insert. It has been developed for manufacturers of molded and machine plastic parts and for use in die castings and all softer materials. It's the Dodge expansion insert to be put by

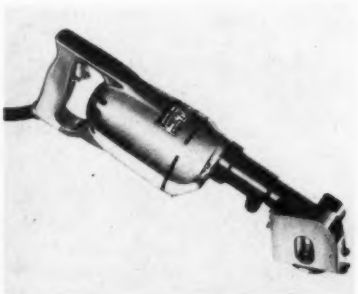
hand or machine-fed into molded or drilled holes at any time after molding. It can be used for air tight assemblies as in gasket hold-down screws and where long-life threads are needed. The insert has a full thread to within 1/32" of the depth of the insert. The Phelps Mfg. Co., Colonial Green Bldg., Westport, Conn., or — **Circle No. E5.**

IN PLASTICS?

• *Plastics Fabrication*
• *Plastic Tooling*
• *Plastics Molding*

A Weigh Feeder for plastic injection molding machines saves material and labor, improves product quality, and increases molding speed. Weigh feeding permits the use of maximum injection pressure which minimizes short shots and flashing. Higher mold temperatures are also possible. Model 213-F-00-IM is installed on top of the molding machine in place of the normal hopper. It features visual weight indication and rapid change-over and adjustment to handle different materials. The Exact Weight Scale Co., Columbus 8, O. **Inform-A-Gram No. E6.**

Fast Cutting, Heavy Duty "Panel Master" Saw is used for cutting plastic laminates, transparent plastics like lucite and plexiglas, and fiberglas reinforced polyesters and resins. The 2" dia. saw blade gives a full



3/8" depth cut and there's no buckling or warping of the sheet on either side of the cut. The Kett KS-3AM saw is available as an electrically or pneumatically powered tool. The Kett Tool Co., 5 E. 3rd St., Cincinnati 2, or — **Inform-A-Gram No. E7.**

Safe At-The-Press Grinding of hard plastics is performed by a Sprue Grinder with a 6½" x 7" throat. Get a bulletin discussing this portable grinder and a brochure of helpful hints on using IMS molded part grinders from Injection Molders Supply Co., 3514 Lee Rd., Cleveland 20, or — **Circle Inform-A-Gram No. E8.**

Proper Tools, equipment, and techniques using "Plaskon" alkyd molding compounds are covered in a revised 8-page booklet from Barrett Div'n, Allied Chemical & Dye Corp., 40 Rector St., New York 6. Graphs illustrate minimum cure time vs. temperature for the three types of alkyd. The booklet discusses mold design and construction; preheating, preforming, and molding techniques; the use of inserts; and molding presses. **Inform-A-Gram No. E9.**

A New One-Part Epoxy Adhesive has a pot life of 30 days and over, and requires no mixing. Resin Complex No. 285 is used where larger amounts of adhesive are required in production processes. Extreme shear strengths of 3000 psi are maintained. Miracle Adhesives Corp., P.O. Box 466, New Philadelphia, O. **No. E10.**

"How To Figure Tool Plastik Materials" is an informative mixing chart giving the amount of tooling plastic needed for a given job. The amount of material needed can be figured in ounces, pounds, or grams. Also included are flexicizer and density charts. For your copy, contact Rezolin, Inc., 5736 W. 96th St., Los Angeles 45, or — **No. E11.**

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for the socket!
AIR
New
Rotor J-2L
Impact
Wrench
cuts time 23%
ROTOR TOOLS
CLEVELAND
Formerly used electric nut setter for assembly of garden tools. Switch to Rotor J-2L Air-powered Impact Wrench cut job time 23%. Savings paid for tool in 12½ weeks.
New J-2L Impact Wrench is reversible . . . specially designed for minimum maintenance.
Find out how *you* can cut costs with the rugged, lightweight J-2L and other new Rotor Tools! Ask for Bulletin 41.
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CIRCLE INFORM-A-GRAM KEY NO. 1331

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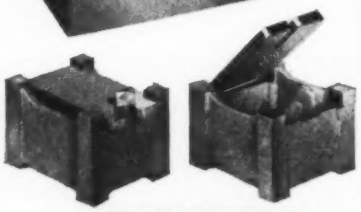
Complete Line—Over 500 Parts

"T" ANGLE PLATES

Fixtures in a Jiffy!

Our "T" Angle Plates have many applications as milling fixtures, comparator stands or drill jigs. The addition of a few special parts make this a complete fixture at little cost. Normalized and precision machine castings. Full scale sheets of 7 standard sizes will be included with your catalog if requested.

BOX JIGS



Box Jigs shown are made in either square or rectangular style in 9 sizes. Have them on hand in several sizes, use them, and watch your profits mount.

MILL FIXTURE BASES

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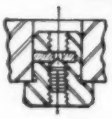
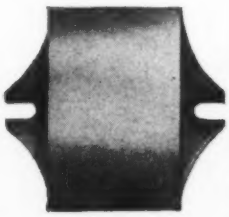


Sure Lock Fixture Keys See Page 41 of our Template Catalog



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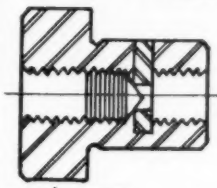

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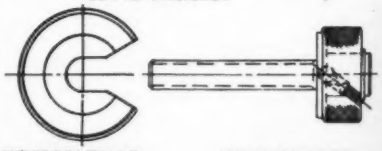

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12	32	51	951	1161	1301	1453	1551	1594	1652	1693	1743	1795
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A4	A23	A42	A61	B12	B31	B50	B69	C8
A5	A24	A43	A62	B13	B32	B51	B70	C9
A6	A25	A44	A63	B14	B33	B52	B71	D1
A7	A26	A45	A64	B15	B34	B53	B72	E1
A8	A27	A46	A65	B16	B35	B54	B73	E2
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A14	A33	A52	B3	B22	B41	B60	B79	E8
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A17	A36	A55	B6	B25	B44	B63	C2	E11
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A7	A26	A45	A64	B15	B34	B53	B72	E1
A8	A27	A46	A65	B16	B35	B54	B73	E2
A9	A28	A47	A66	B17	B36	B55	B74	E3
A10	A29	A48	A67	B18	B37	B56	B75	E4
A11	A30	A49	A68	B19	B38	B57	B76	E5
A12	A31	A50	B1	B20	B39	B58	B77	E6
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A14	A33	A52	B3	B22	B41	B60	B79	E8
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In addition to these advantages, DBL-2 can be heat treated in the same furnaces and atmospheres as 18-4-1 without fear of harmful decarburization. These DBL-2 blades were heated to 2250 F, oil quenched and drawn twice at 1025 F. After heat treatment, blades easily machined such stock as aluminum, stainless steel, carbon steel, aircraft steel, plastics, bronze, screw stock, cast iron and brass.

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CIRCLE INFORM-A-GRAM KEY NO. 1351

Epoxy Plastic Cuts Tool-Up Time And Reduces Costs

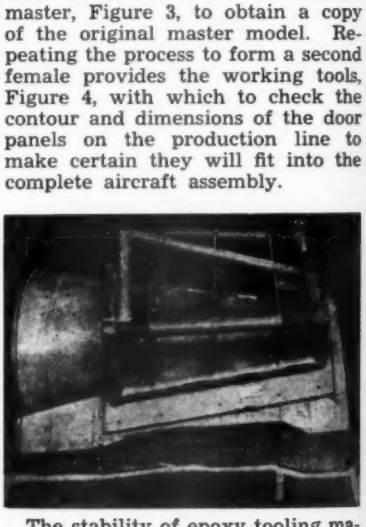
Tools to build interchangeable parts for the U. S. Air Force's powerful new turbojet fighter, the F101A Voodoo, are being made with Bakelite epoxy plastic to cut tool-up time by about 40% and save nearly 40% on costs. The Air Force in conjunction with McDonnell Aircraft Corporation developed the Voodoo as a long-range, supersonic fighter believed to be the most powerful in the world.

To build the Voodoo in production quantities, McDonnell has employed time and cost reducing tools, jigs and fixtures made of compounds developed by Ren Plastics, Inc., Lansing, Mich. For example, lightweight epoxy tools were used to assemble and coordinate production of 75% of all interchangeable door panels on the Voodoo. To be interchangeable from plane to plane, parts must be produced to the exact same size and shape summer and winter, in wet or dry weather, over a period of years.

Ren epoxy tooling plastics possess this dimensional stability to a high degree and enables tools made from it to maintain accuracy over a long production period. The ease of forming tools for complicated airplane contours from epoxy tooling plastics also cuts about 40% off the time needed to produce the same tools in metal prior to large-scale and fast production of these military aircraft.

Reductions of about 40% in the cost as well as the time required to make tools for large-scale production of the Voodoo fighter are made possible with the epoxy plastic. Some of these economical tooling compounds are used to build up contours of a master template model for the Voodoo door panel, Figure 1. This durable surface resists changes in size or shape and preserves close tolerances over years of continuous production.

The master model is constructed from original engineering drawings. A female master control tool is cast against this surface, Figure 2, and a male control is cast from the female master, Figure 3, to obtain a copy of the original master model. Repeating the process to form a second female provides the working tools, Figure 4, with which to check the contour and dimensions of the door panels on the production line to make certain they will fit into the complete aircraft assembly.



The stability of epoxy tooling materials maintains dimensions of the original with a high degree of accuracy during repeated copying back and forth. The thin working surface of each of these copies is laminated from epoxy tooling materials reinforced with Fiberglas cloth. Lightweight tubular frames for these tools are also made of this epoxy

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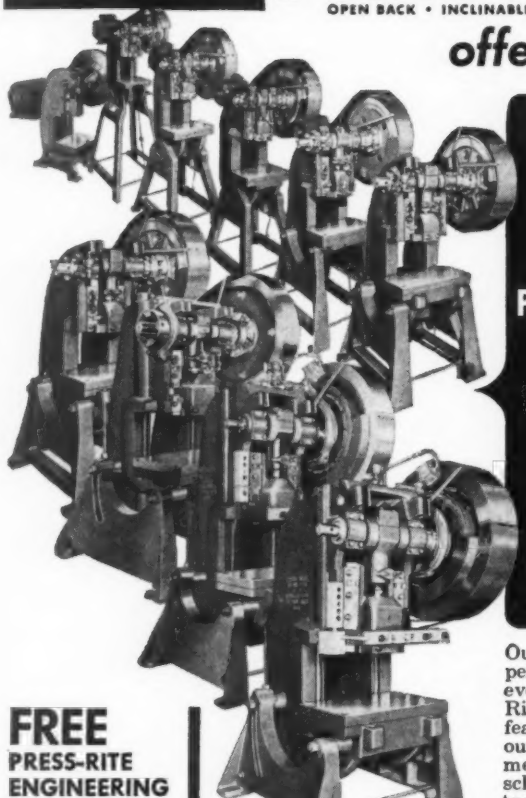

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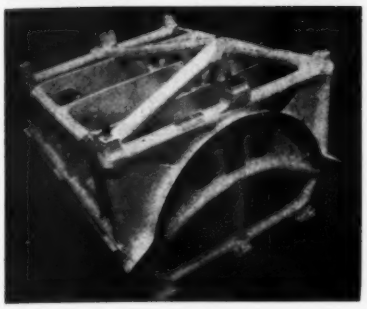
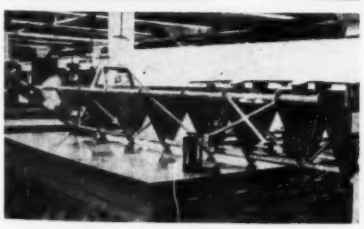


laminate. The female control master tool weighs 56 lbs, of which 90% is epoxy. Made of steel, the same tool would have weighed about 260 lbs.

Rivet holes are accurately positioned, checked and inspected on interchangeable skin panels of the powerful new Voodoo fighter by using tools made with epoxy plastic. Large scale manufacture of the Voodoo by McDonnell calls for a large number of tools, jigs and fixtures to maintain close tolerances of size and shape and assure a perfect fit when assembling separate, interchangeable parts.



Aluminum door panels for the fuselage skins are assembled on production lines with lightweight fixtures made from a laminate of epoxy tooling plastics and Fiberglas cloth, Figure 5. Dimensionally stable, Ren epoxy materials resist moisture, changes in temperature and humidity as well as wear and abrasion.

Lightweight epoxy laminates and reinforced epoxy tubing for the frame form a huge inspection fixture for a Voodoo fuselage section at about one-fourth the weight of a comparable steel or similar tool, Figure 6. The ease and speed with which these epoxy tools are made by semi-skilled labor saves valuable man-hours and reduces the time needed to tool up before launching into large scale manufacture or modifying basic designs. The many tools needed to check, rivet and assemble a single part are quickly duplicated and reduplicated from master control models surfaced with epoxy tooling plastics. With the aid of epoxy tools, parts made by subcontractors are also interchangeable rather than cut to fit, thus permitting quick and easy repair of the powerful fighters.

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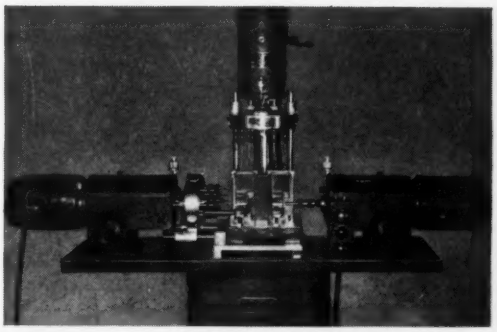

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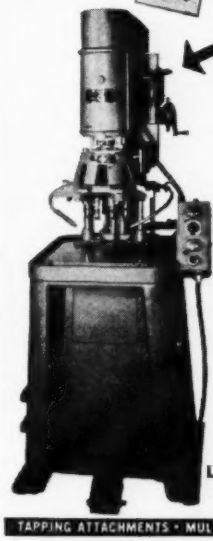

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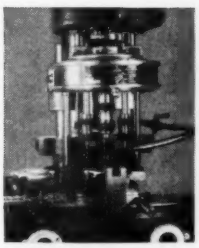

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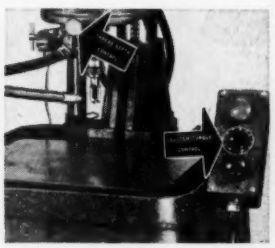

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CIRCLE INFORM-A-GRAM KEY NO. 1371

HUGE PRESS MASS-PRODUCES VOODOO WINGS

Wing skins for the world's most powerful fighter are now being fabricated by the McDonnell Aircraft Corporation of St. Louis on a press which has the largest tonnage of any sheet metal forming press in the western hemisphere.

Operation of the 10,000-ton capacity hydraulic press will help enable McDonnell to meet increased production orders for the Air Force F-101 Voodoo, twin-jet supersonic fighter. The massive jaws of the unit will stretch-press a complete wing skin —94 sq ft of metal—in one operation.

First skins were recently stretch-pressed, trimmed to size by routers and then carefully inspected by both McDonnell and Government personnel. The components passed all tests.

Eventually, all four skins for the Voodoo's thin, swept-back wings will be stretch-pressed in the company's new fabrication area. As each new skin section requires from three to eight days to set up dies, the company will produce a stockpile of each type before shifting production.

The Voodoo's large wing surface

consists of heavy, tapered pre-formed skin sections rather than many pieces laboriously riveted together. Such production technique is expected to amortize the cost of the $1¼ million press in a relatively short time.

Handling costs will be reduced also as production gets underway. As the Voodoo skins were previously sub-contracted, the two-way costs of shipping will now be eliminated. There is also less possibility of damage in transit due to excessive handling.

Built by the Lake Erie Engineering Corporation, the huge press weighs 2,800,000 lbs and is housed in a pit which required 4,455,000 lbs of concrete to form. This metal forming Goliath requires but one operator who can turn out a new wing skin every 15 min. An additional helper driving a Clark lift truck removes the skins by a vacuum cup attachment.

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This conveyor-fed sorting gage checks 2500 automotive push-rods an hour for I.D. and hardness at both ends, overall length, and straightness. A product of Federal Products Corp., Providence, R. I., it sorts good, salvage and scrap parts into separate bins out of the production line and signals if the reject rate is too high.

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Note its advantages: 1½ Horsepower Head or optional 2 Horsepower with continuous duty motor gives 50% or MORE CAPACITY than previously available. A LOT MORE RIGIDITY—A LOT MORE ACCURACY. Increased horsepower and dynamically balanced Cast Iron Pulleys and Drive System make possible the improved production capacity. More weight in the column, heavier ribbed column, heavier knee, heavier saddle. Other improved features. Choose the new SUPER 55, the best machine for your BORING, MILLING and DRILLING operations. Write for literature.

OTHER MODELS AVAILABLE

INDEX MACHINE CO.

541 N. MECHANIC STREET JACKSON, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 1381

AUTOMATIC TURRET PUNCH PRESS IS TAPE CONTROLLED

A new, completely automatic turret punch press, recently introduced by the Wiedemann Machine Company, Philadelphia, embodies the principles of low cost, versatile tooling, minimum setup, and no layout. The press is equipped with automatic controls that cut piercing time, eliminate the fatigue factor, and assure uniform accuracy. All of these features permit more efficient production scheduling. This model has a punching capacity of 40 tons and throat depth of 33".

With this unique automatic press, complicated hole patterns including openings of many sizes and shapes are located and punched in large steel sheets with greater speed and facility than heretofore considered possible. The operator merely loads the material and unloads the finished work.

The press and work locating table are controlled by a tape fed, electromechanical programming unit designed to perform all functions automatically — simultaneously positioning work under the punch, selecting turret station carrying the proper punch and die (any one of 20 up to 6" square) and, then, tripping the press. This cycle is automatically repeated in rapid sequence until all holes are accurately located and punched.

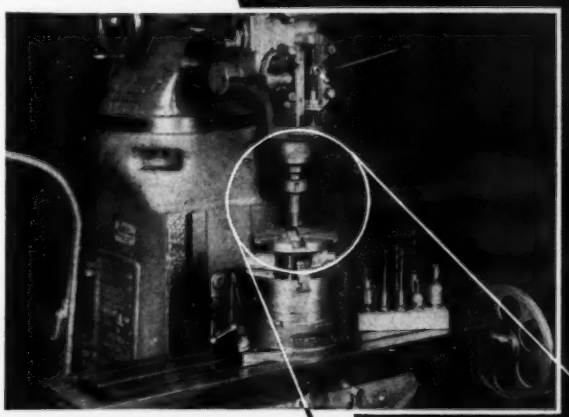
Fig. 1. Overall view of the Wiedemann automatic turret punch press with the tape fed programming control unit shown in the foreground. The press accurately locates and pierces holes up to 6" square in steel sheet without operator attention. The tape fed programming unit controls all press functions — accurately positioning work under the punch, rotating the turret to bring the proper punch and die into piercing position, and tripping the press.

Use of this Wiedemann reduces press operation to pushbutton simplicity and virtually eliminates operator fatigue. Jobs can be produced more quickly and on a predictable schedule. This results in increased production per shift with a predetermined quantity of pierced parts available for subsequent assembly operations. Costly inventory is reduced or eliminated. Steel sheets are pierced as required. Setup is reduced to placing the desired tape in the programmer and loading the material onto the press table. Material is positioned by the operator to mechanical zeroing stops and clamped in position in a matter of seconds.

The special vinyl tape, which is not affected by shop oils or grease, eliminates the need for shop drawings, templates or time consuming manual layout of each hole location. The complete job is punched on the tape and, once prepared, the tape becomes the "template" for the job, which can be used and filed for subsequent use. Since the entire job is contained on one tape, no part of the job information can be lost or misplaced.

Unlimited engineering changes can be made at negligible cost. The location or size of any hole may be

NOW Quick Change Tools... for SMALL MILLS...

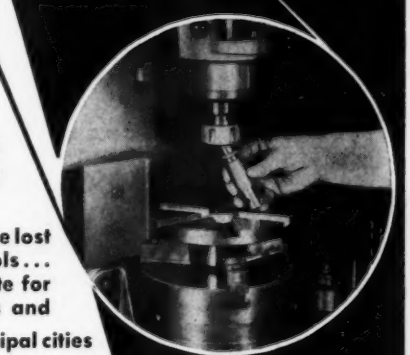


★ 80% saving in down time

★ Only ½ inch tool clearance needed

★ *Not* necessary to move table when changing tools

★ Eliminates loosening and tightening draw bolt



Tools completely eliminate the time lost in changing conventional type tools... Complete sets are available, write for literature covering specifications and price.

Representatives in principal cities

PDQ

PORTAGE Double-Quick TOOL CO.

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CIRCLE INFORM-A-GRAM KEY NO. 1391

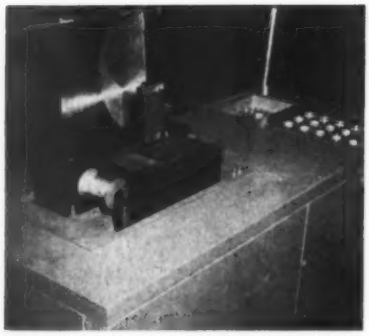


Fig. 2. Close-up of the electro-mechanical programming unit that controls the complete functions of the turret punch press to accurately pierce the job shown in Fig. 3. The operator merely loads the material and unloads the finished work.

changed simply by covering that section of the tape with a gummed sticker, and punching the new information. In fact, any section of the tape can be removed, replaced or covered. The entire programming unit and controls are electro-mechanical. "Building block" units are installed in a cabinet and mounted on sliding, pull-out trays for simple maintenance.

This automatic press has the same basic features of all Wiedemann turret punch presses. The turrets hold all punches and dies normally required for each job. Punches and dies of any size or shape, including groups, louvers and knockouts can be used within the capacity of the press. Any punch or die is brought into piercing position automatically during the work locating cycle without loss of time, and the turrets are locked in position to assure perfect tool alignment. When desired, any punch or die can be replaced in 1½ to 2 min.

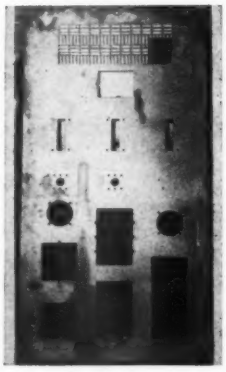
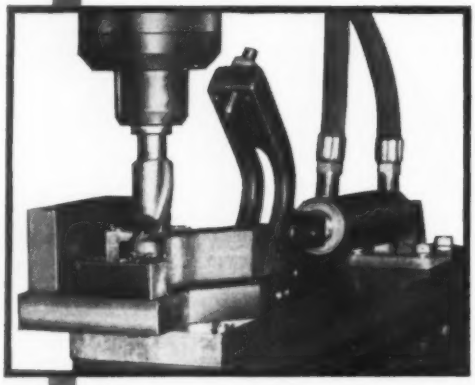


Fig. 3. This panel was pierced on a Wiedemann automatic turret punch press in only 17 min. The photograph actually shows three panels bolted together to demonstrate accurate duplication of complicated hole patterns. Holes of another job pierced with the automatic show through panel openings.

LODDING

pioneers a new era in work-holding

RETRACTING CLAMPS



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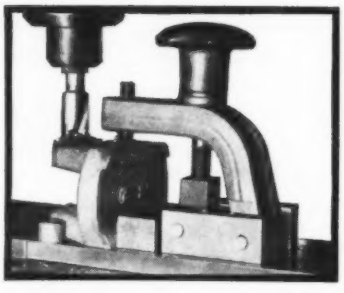
As fast as air, as rigid as a bar of forged steel. Lodding's new Retracting Clamp is self-retracting and adaptable to all work. Four sizes, four types.

For rapid hand clamping, too. Quick as a flick of the wrist, a quarter turn of the screw, and a natural arm movement brings clamp to work and clamps — another quick movement releases work and retracts clamp.



Available with hand knob, cam or nut.

Factory Warehouse

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LODDING, Inc.

WORCESTER 1, MASS.

CIRCLE INFORM-A-GRAM KEY NO. 1401

NEW ALUMINUM PUTTY —EASY TO USE

Devcon F, which consists of approximately 80% aluminum and 20% plastic, is now being used by several automotive companies, machine shops, foundries, and other concerns for filling very large and small holes in aluminum and steel castings, to cover holes which have been drilled incorrectly, and to build up worn sections. The machined surface has an appearance almost identical to aluminum or polished steel. This new material is as easy to use as modeling clay. A large mass can be applied to a vertical surface and will not run or sag. No special skill is required.

Devcon F has excellent adherence

to aluminum and steel, and also to bronze, brass, and cast iron. It will bond to a flat surface and can be machined to a feather edge. It is not necessary to undercut the metal or treat it in any special way. No volatile solvents or thinners are used; therefore the Devcon will not shrink or pull away during hardening.

A special hardening agent is supplied with every Devcon container. The hardener is simply added to the Devcon and mixed by stirring. Two measuring spoons are included for measuring out small quantities.

A 3" dia hole 2" deep in an aluminum part, for example, may be filled with Devcon and allowed to harden or cure. In two hours, no matter how large a mass of Devcon is used, it becomes a rigid, strong, tough piece of metal. This hardening period can be reduced to a few minutes by the use of heat. It can then be re-drilled and re-tapped or machined with regular metal working tools. It will not crack or flake off during later machining. The final appearance will be almost identical to the original metal. Once hardened, it is durable and permanent. It is extremely tough and can be pounded with a sledge hammer and cannot be removed except under extreme conditions.

A representative group of castings repaired with Devcon F. Some were simply filled and ground flush. Some were sand-blasted and later painted and baked. Estimated savings by the manufacturer for entire quantity was $4000.00.

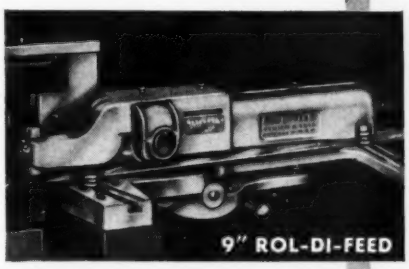
This material can be sand-blasted or treated in a Pangborn or American Wheelabrator or similar machine. After treatment, it is almost impossible to tell where the repair was made.

Devcon F can be painted with standard coatings and then baked. It will not bubble, shrink or run at regular baking temperatures.

This new product is manufactured by the Chemical Development Corporation of Danvers, Massachusetts. Devcon F is the result of an extensive research program, and it has already proved of great value to several large companies who have been experimenting with this unique material. Even a small foundry will normally produce several tons of scrap castings in a week, and every machine shop is constantly finding blow holes or other imperfections in their castings, and they sometimes drill holes in the wrong place. Oftentimes these defects are never discovered until after a considerable amount of time has been spent on the part.

Devcon F is packed in 1, 4, and 15-lb containers, and has practically unlimited storage life. A trial package at a small cost, suitable for the average machine shop or foundry, consists of four 1-lb cans of Devcon F, four small jars containing the exact amount of hardener for each container, two aluminum spoons for measuring out small quantities, and complete instructions for use.

To aid in purchasing the right nuts and bolts, a new publication, "American Standard Square and Hexagon Nuts," has been released by the American Society of Mechanical Engineers. Containing standard dimensions and tolerances for 13 nuts and 8 bolts of varied uses, it has the approval of the American Standards Association.



TOP PRODUCTION every minute . . . of every day!

* 24 hours per day for 3 years — production over 70 million pieces.

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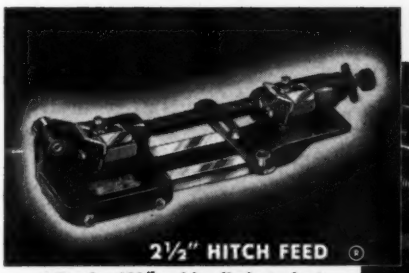
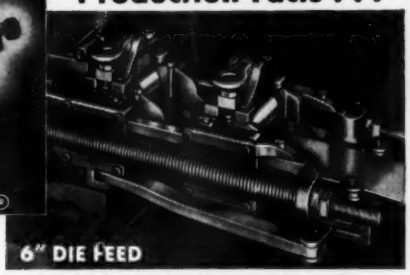
NO AFTER LUNCH LET DOWN . . .
with Dickerman automatic punch press feeds!



* Feeds .020" cold rolled steel at 336 strokes per minute — over 160,000 pieces per 8 hour day.

These Are Actual Production Facts . . .



* 3 feeds produced over 100 million pieces in less than a year.

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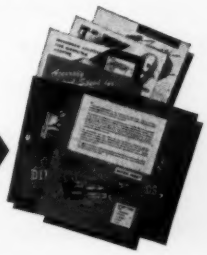
*Actual users names furnished on request.

12 standard feeds can be shipped from stock to solve your immediate problems. Send for literature today!



CIRCLE INFORM-A-GRAM KEY NO. 1411

Fabricating Drop Hammer Dies From Resilient Epoxies

Plastic-capped Kirksite drop hammer dies suitable for forming duct halves, beads, angles, channels, and shallow pan sections have been developed by the Plastics Group of the Manufacturing Research & Development Department of Republic Aviation Corporation.

The drop hammer dies are constructed of Kirksite bodies capped with a 1" layer of epoxy resin compounds. The die face is composed of a rigid epoxy resin compound containing a wear resistant filler such as aluminum oxide. A resilient epoxy compound is used for the punch face.

The resilient compound is based on a combination of a liquid epoxy resin with a liquid polysulfide polymer. It cures at room temperature, in the presence of an amine catalyst, to a tough resilient material able to absorb the severe impact stresses developed in drop hammer operations. Punch faces of this type produce aluminum and steel parts with a minimum of wrinkling.

One of the methods developed by Republic for making plastic-capped drop hammer dies is partially illustrated in the accompanying photographs.

Fig. 1. The plastic-capped Kirksite drop hammer dies seen here were mounted in the conventional manner using molten lead. Note the chamferred edge of the plastic caps. This is done to prevent the chipping off of the plastic edges. The new resilient compound used for the punch face is based on a combination of a liquid epoxy resin with a liquid polysulfide polymer.

Fig. 2. Smooth, mar-free part is removed from the new plastic-capped Kirksite dies. This type of configuration lends itself particularly well to plastic capped dies. Punch faces of this type produce aluminum and steel parts with a minimum of wrinkling.

A plaster foundry pattern and a plaster cast are first made of the part to be formed. A Kirksite female die is then rough cast from the plaster pattern and a Kirksite male is poured directly against the female.

The Kirksite bodies are rough sanded to remove the surface oxide. The male plaster cast is waxed and positioned approximately ½" from the female Kirksite body which will serve as the die face of the hammer. The unit is plaster dammed and held at a 45° angle with the Kirksite up

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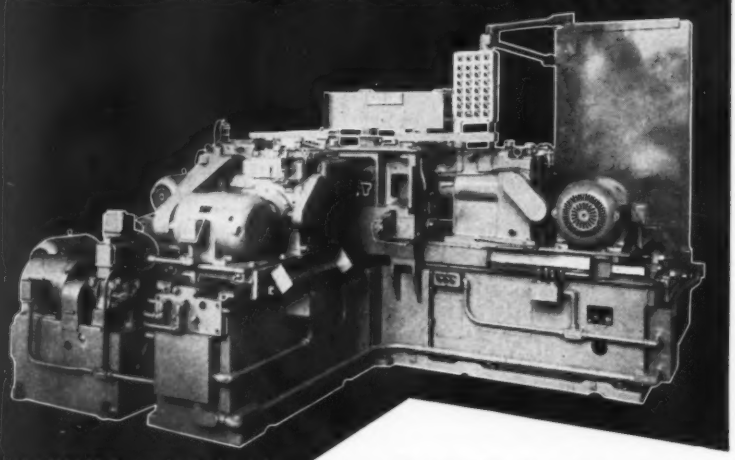
PRODUCTION · EFFICIENCY · SAVINGS



Model MR138 four-way, horizontal machine for boring, counterboring, facing, chamfering and drilling tractor main frame housings.

Use an individually designed "Hole-Hog" Machine Tool for such jobs as:

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Over 50 years of Machine Tool Engineering experience is at your service. Tell us your particular problem.

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MOLINE TOOL COMPANY
100 20TH STREET MOLINE, ILLINOIS

CIRCLE INFORM-A-GRAM KEY NO. 1421

to permit entrapped air to rise to the Kirksite surface, away from the face of the die.

The unmodified epoxy compound containing a suitable filler is mixed with catalyst and poured into the gap. After the resin is cured at room temperature for several hours, the resultant plastic die face is waxed. The Kirksite male punch is positioned 1" from the plastic die face and plaster dammed.

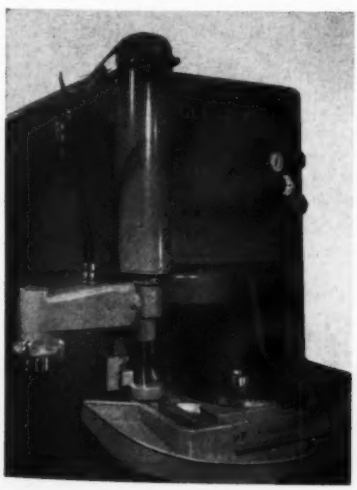
The resilient epoxy resin-polysulfide liquor polymer mix is mixed, poured into the gap and allowed to cure. The dies are parted and the plastic caps are then chamferred.

The polysulfide liquid polymers used in these combinations are manufactured by the Thiokol Chemical Corporation. Compounds incorporating suitable combinations of epoxy resins with polysulfide liquid polymers are available from a number of processors.

Aside from the aircraft industry, drop hammer tools faced with resilient epoxy-polysulfide liquid polymer compounds are useful in many other metalworking fields.

Quenching Press Automatically Unloaded

A completely automatic unloader, recently developed for the Gleason No. 16 quenching press, is attached to the left front corner of the press, and is controlled by built-in switches and valves. It can be attached to existing No. 16 quenching presses.

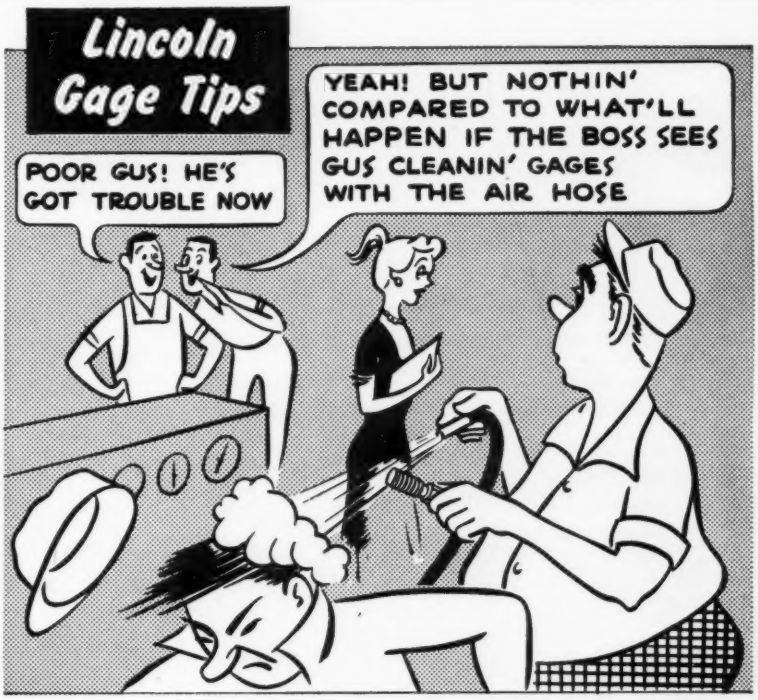


The sequence of operation of the unloader is:

1. As the press carriage advances to unloading position, the unloader arm rotates into position over the quenched part.
2. The unloader head lowers, and adjustable jaws close on the quenched part.
3. Holding the quenched part, the unloader head raises and rotates through 180°.
4. The jaws open, releasing the quenched part into a tote basket or a conveyor.

Thus this unloading attachment makes it possible to speed production, or to reduce labor requirements, or both, in the operation of these quenching presses.

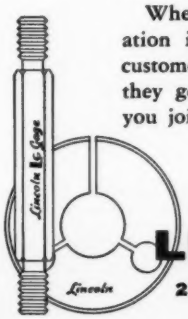
The quenching press accommodates round, flat, or irregularly-shaped parts up to 15" in the largest dimension and provides quenching under close automatic control at all stages of the quenching cycle. Since the parts are held between accurate dies during the quenching cycle, they are properly hardened with a minimum of distortion.


Lincoln Gage Tips
POOR GUS! HE'S GOT TROUBLE NOW
YEAH! BUT NOTHIN' COMPARED TO WHAT'LL HAPPEN IF THE BOSS SEES GUS CLEANIN' GAGES WITH THE AIR HOSE

AIR HOSES can damage a thread gage. Moisture will be deposited on the threads and quickly form a rust spot. Use a clean cloth to dry the gage after it has been rinsed in a good cleansing agent. Cover the gaging members with a rust preventative and moisture-proof coating before storing.

Thread gage tolerances are microscopic. A little carelessness or misuse can spoil a valuable tool.

When we make thread plug and ring gages, each operation is carefully and skillfully executed. We know our customers want fine precision gages, and we see to it that they get what they want when they want it. Why don't you join our many satisfied customers.



LINCOLN GAGE CO.

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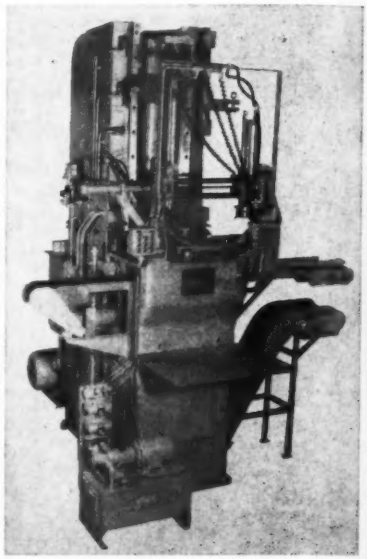
CIRCLE INFORM-A-GRAM KEY NO. 1431

Broaching Machine Equipped for Automation

Designed for conveyor line automation, a recently developed 30-ton, 60" stroke pull-down broaching machine automatically broaches 10 internal splines in an automotive brake drum in one pass. The machine automatically picks up parts coming in from a conveyor line, transfers them into the broaching position and after broaching, ejects them back onto the line.

A hydraulically operated loading mechanism with an internal chucking device picks up the part off the conveyor line, and transfers it across to the sliding work-holding fixture. The collet type fixture automatically clamps the part and moves it into broaching position. The broach is pulled down through the part, broaching 10 1" wide splines in the workpiece. At the end of the broaching stroke the slide moves out, automatically ejecting the part back on to the belt conveyor. The broach returns to starting position. During the broaching and return stroke the loading unit moves across on guide rails, picks up another part from the conveyor line and returns ready to reload the work fixture. The machine runs continuously on automatic cycle as long as parts are coming in from the conveyor line.



Accessories incorporated in the machine are (1) a separate oil tank provided for the hydraulically operated fixture, (2) an automatic chip conveyor unit for disposal of chips, (3) a full follow-up retriever mechanism which follows the broach through the stroke.

Tooling includes precision type broach pullers with multiple springs and alignment pilots, a hardened and ground arbor that holds 10 broach assemblies, and American HSS sectional surface broach assemblies approximately 48" long.

This broaching machine has been developed by the American Broach and Machine Co., a Division of Sundstrand Machine Tool Co., Ann Arbor, Mich.

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Why did many exhibitors at the show use Buck chucks to hold work? Because they know that their good machines are even better with the dead true precision of Buck universal scroll chucks.

Their free choice of chucks can be a pretty reliable guide for any tool room or production shop. Look into the Buck for your work. Here's why:—*Dead true precision within 1 minute without shims; .0005" precision on duplicate work without readjusting; handles collet work without collets; keeps accuracy longer, wears longer—yet costs no more than conventional chucks!*

If your work can be handled by chucks up to 9" diameter get the facts about the Buck. Comes in 6, 3, and 2 jaws—*the original precision scroll chuck.* Write today.

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CIRCLE INFORM-A-GRAM KEY NO. 1441

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PERFECT HOLES

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• A NEW NAME-"ROTARY BROACH"*

ROTARY BROACHES may be used in lathes, turret lathes, automatics, drill presses, etc., to replace reamers. They produce perfect holes with finishes that can only be compared to honing. They last longer before grinding is necessary and may be resharpened 10 to 30 times. They produce perfect holes at a fraction of the cost of those produced by other methods. Eliminates grinding, lapping, honing and boring.

USE THIS NEW MACHINING METHOD—ROTARY BROACHING*
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Patented in Canada, U.S. and Foreign Patents Pending 1947
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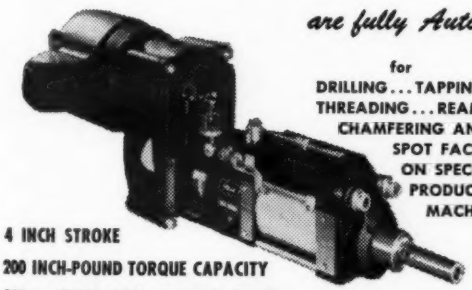
7045 DARBY AVE., RESEDA, CALIFORNIA

CIRCLE INFORM-A-GRAM KEY NO. 1451

THE Hause Holomatic DRILL UNITS



are fully Automatic for DRILLING...TAPPING... THREADING...REAMING... CHAMFERING AND SPOT FACING ON SPECIAL PRODUCTION MACHINES

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200 INCH-POUND TORQUE CAPACITY
300 to 15,000 RPM SPINDLE SPEEDS

AIR ACTUATED HYDRAULIC FEED
FOUR MODELS TO CHOOSE FROM

The Hause Holomatic Drill Units use shop air line pressures for thrust and feature a self-contained hydraulic system for positive spindle travel control and feed regulation. Rapid traverse distances and feed rates are infinitely adjustable in both advance and retract movements of each cycle. Automatic, semi-automatic or manual cycling, skip-drilling, manual jogging and positive stop with dwell operations are all easily achieved. A built-in air control valve simplifies set-up and reduces installation costs. All models mount at any angle.

WRITE FOR DESCRIPTIVE LITERATURE

Hause ENGINEERING
MONTPELIER, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 1452

NEW NUMBERALL CUTS THE COST OF STAMPING NUMBERS

LOW COST Model 60
MULTI-WHEEL NUMBERING MACHINE

MODEL 60
Can be furnished with 2, 3 or 4 wheels and in character sizes of 1/16", 3/32" or 1/8".

Because there are so many industrial uses for a lower cost numbering machine, Numberall introduces Model 60, similar in performance to the famous Model 70 but much simplified in construction.

Instead of retaining pawls, pawl block and bronze spring to keep the wheels in proper places, a *single locking pin*, thrust through the frame and fitting into wheel slots, holds the wheels in place and in perfect alignment. The wheels have eleven divisions with engraved characters from 0 to 9 and one blank space.

Model 60 is made with hand shank for hammer stamping. It is light and compact—ideal for stamping all kinds of products and parts of light metals, unhardened steel, etc. wherever a permanent mark is desired.

Write for price information and Bulletin TP 60.

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HUGUENOT PARK STATEN ISLAND 12, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 1453

ARROW TOOL & REAMER CO. • Established 1916

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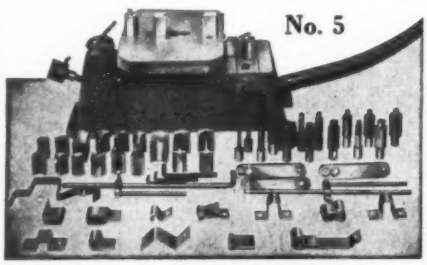
CIRCLE INFORM-A-GRAM KEY NO. 1454

Through-Broached Socket Screws Aid Assembly

A new patented version of the socket set screw, with the socket extending the full length of the screw is now obtainable in a range of sizes from No. 4 wire size to 1" diameter in suitable lengths, and in either the hex or multiple-spline socket. This unusual set screw is a development of The Bristol Company of Waterbury, Conn.

The through-broached socket is symmetrical, and the screw can thus be wrenched from either end. This makes it very useful in automatic assembly processes because orientation is simplified. No grinding or modifications are necessary for use in power screwdrivers.

The holding power of the new screw is equal to that of conventional socket set screws, so no modification in design is required in using them. They can be used either as set screws or as locking rings.



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BENDER-CUTTER

CUTS, BENDS, PUNCHES

Available in hand or air operated models, the MULTIFORM is shipped complete with full assortment of dies and mandrels to form and cut round or flat stock up to 1/8"x1 1/2" as illustrated. Punching and round end blanking dies available. Other models up to 1/4"x4" air operated.

ALSO AIR OPERATED MODELS.

J. A. RICHARDS CO. KALAMAZOO, MICH.

CIRCLE INFORM-A-GRAM KEY NO. 1461

ADJUSTABLE ROD GUARD for Power Presses

HUMM SAFETY EQUIPMENT CO.

MFGR. OF COMPLETE LINE OF PRESS GUARDS

249 Sheffield Ave. • BROOKLYN 7, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 1462

Order Today still for only $183.60

...you can have the best 500 lb. lifter made

It will pay for its self over and over again in time and labor saved in moving dies, machine parts, stacking, and lifting. A one-man machine that does a three-man job.

A rugged simple machine with few moving parts; no complicated mechanism to get out of order. Structural steel welded construction, built to last a lifetime with practically no up-keep expense. Has big built-in safety overload factor.

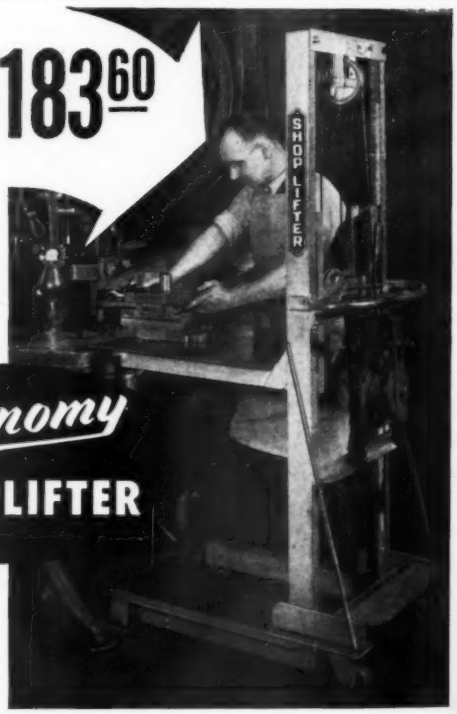
Platform lift 4' 6" yet overall height will clear any standard doorway. Width 24", moves easily between machines or in narrow aisles. Spur gear hoist unit lifts loads with only 20 lb. crank pressure. Automatic friction disc clutch holds loads securely at any height.

Type D — 500 lb. capacity....$183.60
f.o.b. Chicago

The lowest priced lifter of its type

These prices guaranteed for 30 days only

1000 lb. & 2000 lb. Shoplifters available. Or a special can be built for special jobs. Write for details.



Economy SHOPLIFTER

MAIL ORDER TODAY your Shoplifter will be shipped within 24 hours after we receive your order. Or phone at our expense, ask for Don Suhr. —

PERFORMANCE GUARANTEED — if you are not completely satisfied with your Shoplifter after 10 days trial, return for full credit.

ECONOMY ENGINEERING CO., 4509 W. Lake St. Chicago 24, Ill. Phone Estebrook 8-9110

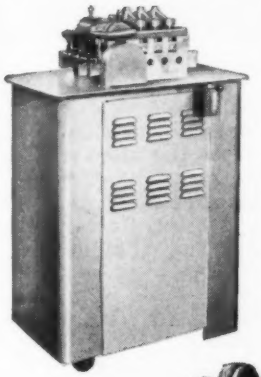
Eastern Sales Office 342 Madison Ave., New York 17, N. Y. Phone — Murray Hill 2-8940 • Representatives in all principal cities.

CIRCLE INFORM-A-GRAM KEY NO. 1463

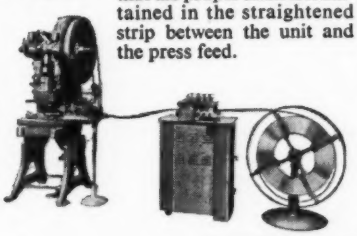
Economy • Dependability

WITTEK

STOCK STRAIGHTENERS



Used in conjunction with a reel stand and automatic feed for punch presses, the Wittek Stock Straightener is a self-contained, motor-driven unit designed for maximum efficiency in the continuous straightening of coiled stock. Standard models handle stock with widths up to 12 inches. An infinitely variable speed drive permits any desired straightening speed so that the proper slack is maintained in the straightened strip between the unit and the press feed.



This typical Wittek automatic production feeding setup includes —Wittek roll feed mounted on the punch press, Wittek stock straightener, and Wittek self-centering reel stand.

5577

Write for full particulars

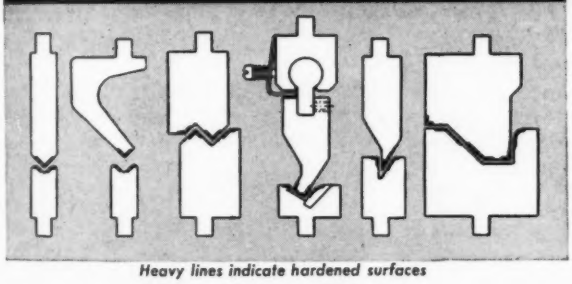
WITTEK Manufacturing Co.

4323 W. 24th Place • Chicago 23, Illinois

Production Feeding Equipment

CIRCLE INFORM-A-GRAM KEY NO. 1471

CHICAGO INDUCTION HARDENED PRESS BRAKE DIES



Heavy lines indicate hardened surfaces

for greater die life— at no extra cost— on any make press brake

Whether it is a simple die for angle bending or the more complex dies for any of the combined bending and forming operations, CHICAGO induction-hardened dies offer bonus performance at no extra cost. Field reports on these dies show better than ten times the useful life of the conventional dies used in press brakes. Get the full particulars on CHICAGO induction-hardened dies for your next press brake job.

Steel Bending Brakes For Over Fifty Years 4901

DREIS & KRUMP MANUFACTURING COMPANY

CHICAGO STEEL BENDING BRAKES BOX and PAN BRAKES PRESS BRAKES

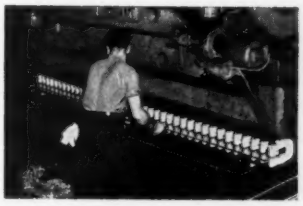
7428 S. Loomis Blvd., Chicago 36, Ill.

CIRCLE INFORM-A-GRAM KEY NO. 1472

GUARANTEED

Reduced Press Down-Time with TOOLSET

. . . Your opportunity for BIGGER PROFITS



Do as Morrison Railway Supply Corp. of Buffalo, N. Y. did . . . they reduced press down-time on this forty punch job to 45 minutes, a savings of more than 90% by using TOOLSET self-contained units in place of fixed dies. The TOOLSET punches required only 2 hrs. set-up time outside the press.

This is only one profit building feature that you get with TOOLSET units, here are more:

- **LOW INITIAL COST**
- **FAST SET-UP BY UNSKILLED LABOR**
- **ELIMINATE COSTLY FIXED DIE SETS**
- **TOOLING REUSABLE, SET-UP AFTER SET-UP**

. . . These cumulative savings result in a substantial lowering of per piece part cost. And, in most cases, Toolset Units permit you to render faster service . . . a bonus feature in better customer relations.

Toolset Hole Punching and Notching Units are available in seven widths from ¾" to 3½"; throat depths from 4" to 16". Punches available in round, square, rectangular, obround or special shapes as required.

TOOLSET Inc.

2181 Elmwood Ave., Buffalo, N. Y.

Start cutting costs NOW— Send coupon for Catalog of complete Toolset Line

Toolset, Inc.
2181 Elmwood Ave., Buffalo 7, N. Y.

Gentlemen:

Please furnish a copy of your Catalog on Hole Punching and Notching Units.

Name .....

Title .....

Firm .....

Address .....

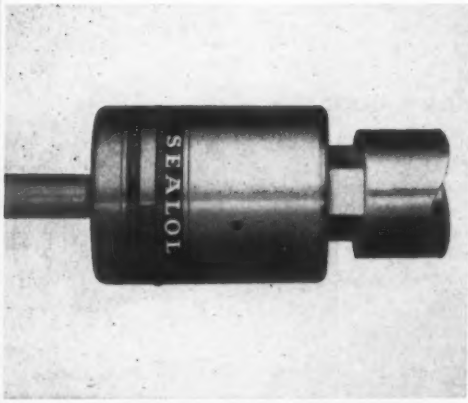
City .....

Zone ..... State .....

CIRCLE INFORM-A-GRAM KEY NO. 1473

PROGRESS

NEW DEVELOPMENTS • IMPROVEMENTS • COST AND TIME SAVERS

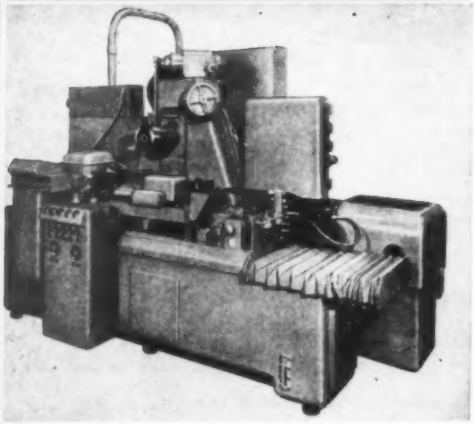


FLUID TRANSFERS . . .

Standard fluid transfers produced by Sealol transfer fluids under pressure to rotating equipment. Used on deep or precision drilling equipment for chip removal operations and for cooling the cutting edge, their capabilities range up to 1000-psi fluid pressure and 10,000-rpm shaft speed. Sealol Corp., 197 Post Rd., Providence 5, R. I. **Circle No. A1.**

MEASURING COMPARATOR . . .

Guaranteed accurate to one micron, 0.000039″, is a new measuring comparator. In addition, it can be read in fractions of a micron. Model 100 meets the exacting requirements of gage laboratories, inspection departments, tool and die makers, and machine shops. Paul M. McPherson Precision Instruments, 527 Main, Acton, Mass., or — **Inform-A-Gram No. A2.**



AUTOMATIC GEAR GRINDING . . .

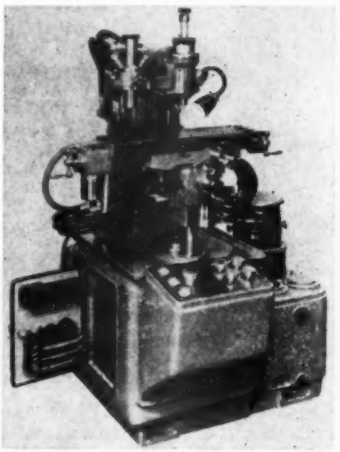
A new line of fully automatic gear grinding machines is now available. Automatic features include loading, rejection, stock equalizer, and release of work pieces. Controlled flow of coolant through the grinding wheel insures non-tempered, case-hardened gears. Gear Grinding Machine Co., 3901 Christopher, Detroit 11. **Inform-A-Gram No. A3.**

11″ SWING LATHE . . .

The Harrison 11″ swing lathe has an 18″ swing in gap and a 4½″ width in front of the faceplate. Incorporating ruggedness plus high precision, this small, low-priced machine is used for tool room and production work. The "all-geared" type headstock has eight spindle speeds. Stanley Sheppard, 30 Church St., New York 7, or — **Inform-A-Gram No. A4.**

PROFILE MILLING MACHINE

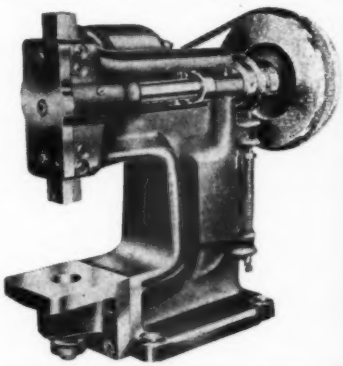
A fully automatic profile milling machine, the Wickman-Hayes Tracemaster, is used for three dimensional copy milling or dies, rubber and glass molds, turbine blades, and irregular shaped workpieces. The table has vari-



able cross feeds of 0.005″ to 0.250″. The "Hydrotracer" copying valve controls, from a master form, the rise and fall of the knee and the table traverse speed. The Wickman Products Corp., 10325 Capital Ave., Oak Park, Detroit 37, or — **Circle No. A5.**

BENCH TYPE PUNCH PRESS . . .

Slotting, cutting, perforating, pinking, coring, marking, embossing, creasing, punching, etc., can be done with a new power bench-type punch press. Model



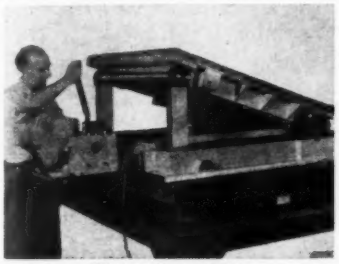
LTX has a capacity up to 250 operations/min. of continuous operation. It can do the work of heavier machines, leaving them free for larger dies. Alva Allen Industries, Punch Press Dept., Clinton, Mo., or — **Circle No. A6.**

ON PARADE

Mail FREE Inform-A-Gram Card for MORE Details.

48" X 48" SINE PLATE . . .

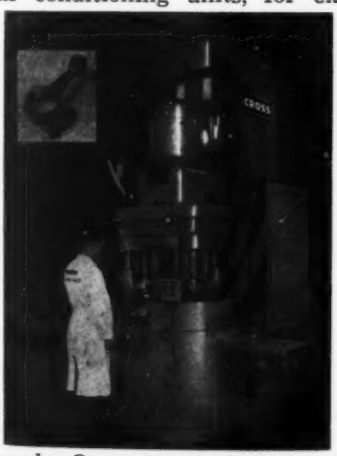
A 48" x 48" sine plate has been added to the standard line of sine plates and magna-sines produced by Omer E. Robbins Co. It is believed to be the largest sine plate with electrically powered adjustment ever built, having 2304 sq. in. of working area. Gage blocks are positioned at both open corners to eliminate dimensional inaccuracies due to dis-



tortion. This plate features patented, specially designed swivel blocks to assure evenly distributed weight over a greater area. Maximum angle setting is 60°. Omer E. Robbins Co., 24800 Plymouth Rd., Detroit 39, or — **Circle Inform-A-Gram No. A7.**

CONNECTING ROD MACHINE

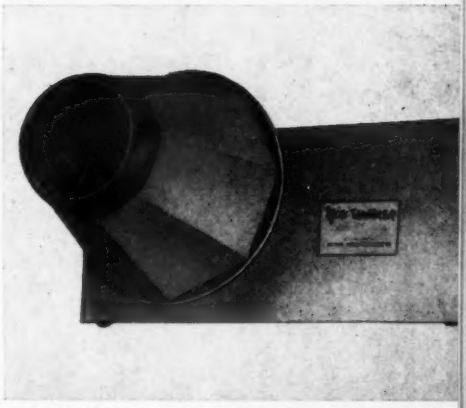
Four connecting rods with different center distances can be handled by a new connecting rod machine. It machines two sizes of connecting rods in the same setup and processes rods used in air conditioning units, for ex-



ample. Operations include rough drilling and finish reaming the wrist pins and crank pin holes. The inset shows the product processed. The Cross Co., Detroit 7, or — **Circle No. A8.**

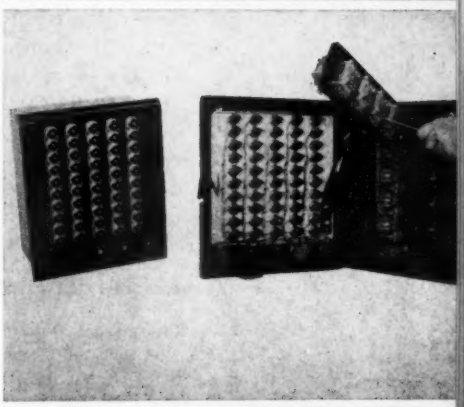
SMALL PARTS TUMBLER . . .

The "Mini-Tumbler" is a small bench tumbler with one-gallon-volume barrel. It's constructed to stand up under continuous operation on the tumbling of small parts in foundries, plating shops, screw machine shops, etc. This barrel finisher weighing 25 lbs is 16" x 9" x 7¼". Rampe Mfg. Co., 14915 Woodworth Ave., Cleveland 10, or — **Circle No. A9.**



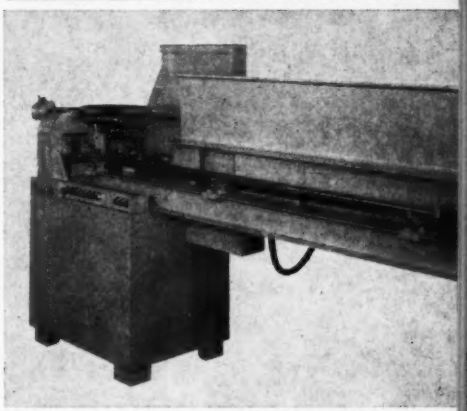
ELECTRONIC SCANNER

A new electronic scanner that can monitor up to 25 production points is used to check variables including temperatures, level, flow, and pressure. It makes possible economies in bridging the gap from manual to automatic plant operation. Fielden Instrument Div'n Robertshaw-Fulton Controls Co., 2920 N. 4th St., Philadelphia 33, or — **Inform-A-Gram No. A10.**



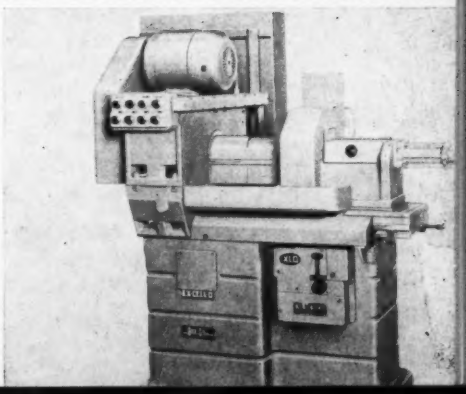
TUBE CUTTING . . .

Cut tubes faster, without loss of stock using the Brehm tube cutter. It cuts any length tube from ⅛" on up, in ⅜" to 2¼" dia. The cutter is used on mild steel, stainless steel, brass, copper, and aluminum. The tube is enclosed in a supporting arbor and doesn't rotate. Steel Products Engineering Co., Springfield, O., or — **Circle No. A11.**



DEEP HOLE DRILLING

Drill deep holes accurately from the solid using the Ex-Cell-O "Bor-Dril". Cored holes can be finish-machined in one operation. Coolant is supplied under high pressure through the gun type drill. With multiple spindle arrangements, two or more holes can be drilled simultaneously. Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, or — **Circle No. A12.**



Tough grinding jobs?

Check Vulcanaire high speed precision grinding heads!

Grinding circular slot using Vulcan's Rotary Table and Magnetic chuck.

Many seemingly impossible grinding problems have been solved by adapting Vulcanaire to standard machines or by using one of Vulcan's specially designed machines.

On Surface Grinders, merely remove wheel and guard, clamp vertical or horizontal adaptor to machine as illustrated. No belts necessary. For instance, Vulcanaire used in connection with Vulcan's Rotary Table for Surface Grinders permits the grinding of a circular slot.

Vertical adaptor for Surface Grinders. Grinding small slots

Adaptors are in stock to fit the spindle of Vertical Milling Machines for grinding contours, holes and slots.

On Internal Grinding Machines Vulcanaire's infinitely controlled speeds furnish the correct surface cutting speed resulting in faster production and micro finish. The adaptor sleeve fits into present housing.

Applied to Jig Boring Machines, Vulcanaire is liked by leading precision manufacturers because its accuracy is guaranteed, producing Vulcanaire jig grinding of large and small parts.

Horizontal application. Grinding a shoulder Punch.

Send us a blue print on your toughest grinding problem. Recommendations and sketches will be returned to you — no obligation.

Major Vulcan Services

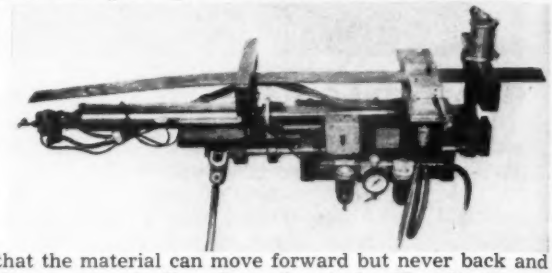
Engineering, Processing, Designing and Building... Special Tools... Dies ... Special Machines ... Vulcamatic Transfer Machines ... Automation ... including the Vulcan Hydraulics that Form, Pierce, Assemble and size. ... Vulcanaire Jig Grinders ... Motorized Rotary Tables ... Plastic Tooling.

VULCAN TOOL CO.

741 LORAIN AVE. • DAYTON, OHIO

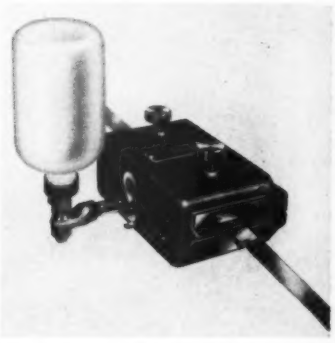
CIRCLE INFORM-A-GRAM KEY NO. 1501

The Accuracy and Dependability of the "Micro-Slide" gripping principle is incorporated in a new air-operated power press feed. The "Micro-Air" press feed can handle lengths up 48". The rollers are cammed so



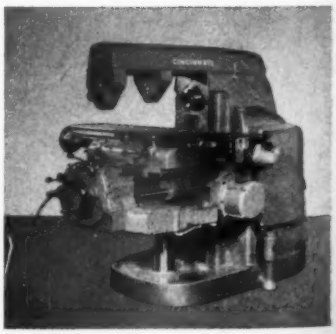
that the material can move forward but never back and they never actually release the stock. No adjustments are necessary when feeding different thicknesses of stock. Nadel Mfg. Co., 20 Warren St., New York 7, or — **Circle Inform-A-Gram No. A13.**

A Low-Cost Oiler-Straightener cleans, straightens, and lubricates stock up to 3" wide in one operation. It's designed to remove "coil-set" but won't straighten or flatten badly kinked material. Hand oiling is eliminated. Jaco Devices, Inc., 96 High St., Hingham, Mass., or—**No. A14.**

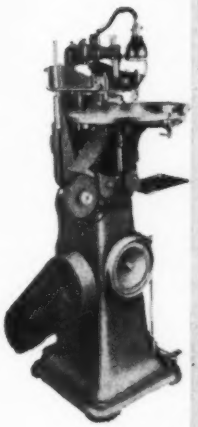


A Built-In Dust Collector Unit is a feature of an improved tool and snagging grinder. The Kalamazoo "No-Dust" Grinder is available in three sizes of 1, 2, and 3-hp motors using 10", 12", or 14" dia. grinding wheels. Shown is Model ND-12A which is produced by Hammond Machinery Builders, 1631 Douglas Ave., Kalamazoo, Mich.—**A15.**

New Dial Type Milling Machines have a wider range of speeds and feeds for machining operations on light metals and the newer, tougher alloys. They're built in Nos. 2, 3, and 4 sizes and Universal, Vertical, and Plain (as shown) styles for each. The Cincinnati Milling Machine Co., Cincinnati 9, or — **No. A16.**



You, Like Thousands of Others, Can Cut Die Making Costs with OLIVER DIE MAKING MACHINES



Dependable and proved are OLIVER Die Makers. They reduce costs as much as 60% because they simplify sawing, filing and lapping operations. The Oliver Method saves time and does not require expensive hard-to-get skilled labor. These efficient, speedy and accurate machines have proved themselves in more than 10,000 installations throughout the world. In many plants these durable OLIVERS have been in constant use for over 25 years.

For nearly 40 years OLIVER DIE MAKING MACHINES have been found invaluable on such jobs as Production Filing, Experimental Work, Metal Patterns, Cams, Gages, Templates, etc. Improve your toolroom efficiency . . . For *better* dies—saw and file with OLIVER DIE MAKING MACHINES.

BE WISE OLIVERIZE

OLIVER DIE MAKERS Available in 5 Models

The Bench Model S-1 (illustrated) is a single speed die maker for use on tool steel up to 1" thick.

The Heavy Duty Model (illustrated) has 6 speeds, works in metal up to 3" thick, has variable strokes to 5" with hydraulic feed.

Write Today For Complete Technical Data on OLIVER DIE MAKERS

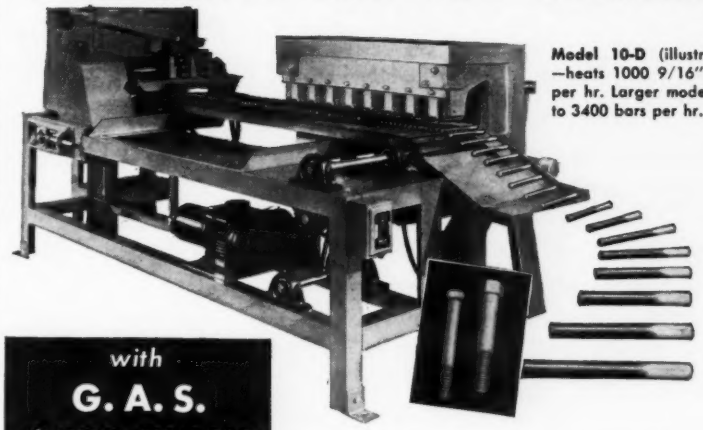
See our catalog in Sweet's Directory

MACHINE TOOLS by OLIVER include:
AUTOMATIC DRILL GRINDERS
TOOL & CUTTER GRINDERS
DRILL POINT THINNERS
TEMPLATE TOOL GRINDERS
FACE MILL GRINDERS
DIE MAKING MACHINES

OLIVER INSTRUMENT CO.
1436 E. MAUMEE • ADRIAN, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 1511

AUTOMATIC BAR END HEATING



Model 10-D (illustrated) —heats 1000 9/16" bars per hr. Larger models up to 3400 bars per hr.

with G. A. S. ROTO-FLAME FURNACE

Present installations of these gas-fired High Speed End-Heating Units are giving their owners—

- **Increased production:**
  - by faster heating
  - by automatic feeding
  - by producing fewer rejects
  - by eliminating long heat-up periods
- **An improved product:**
  - by eliminating objectionable scale
  - by producing a better formed product

  (fast heating improves plasticity of metal)
- **Reduced operating costs:**
  - by saving labor
  - through longer die life
  - through savings in floor space

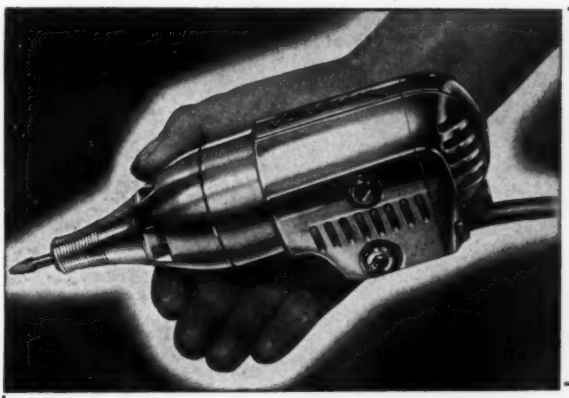
Write for Bulletin 350-A

INDUSTRIAL GAS EQUIPMENT DIVISION CODE OF ETHICS SIGNER GAS APPLIANCE MANUFACTURERS ASSOCIATION

Signer No. 40

GAS APPLIANCE SERVICE, INC.
Industrial Gas Engineers
1201 WEBSTER AVENUE • CHICAGO 14, ILLINOIS

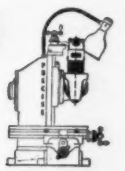
CIRCLE INFORM-A-GRAM KEY NO. 1512



SUPER 30

World's most powerful and accurate hand!

Precise Super 30 Grinder-Millers bring new speed, accuracy and versatility to production or tool room milling, grinding or finishing operations. They weigh only 35 ounces, yet deliver 45,000 RPM, have a strong 1/5 H.P. motor, are accurate to .0001", run cool and can be used by hand or mounted on machines with abrasive wheels or new tungsten carbide tools. Save time, improve quality, increase tool life, and discover new tooling possibilities with the PRECISE SUPER 30.



HIGH RPM MILLING MACHINES

PRECISE POWER QUILLS

Attach this ad to your letterhead for FREE demonstration or literature!

PRECISE PRODUCTS CORPORATION
1341 CLARK STREET, RACINE, WISCONSIN TP-11
Quality and precision since 1882

Precise

CIRCLE INFORM-A-GRAM KEY NO. 1513

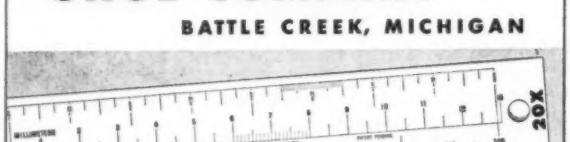
Gage Company PRECISION PLASTIC
COMPARATOR SCALES

Non-breakable...accurate...designed for making quick measurements at scale on projectors and comparators without any movement of machine or work.

An unexcelled tool for use in drafting and constructing scale layouts for comparator chart use. All standard magnifications and various styles for every application.

WRITE FOR BULLETIN NO. 54-1511

GAGE COMPANY
BATTLE CREEK, MICHIGAN



CIRCLE INFORM-A-GRAM KEY NO. 1521

A SMALL LOT
METAL STAMPING SERVICE
AT LOWEST POSSIBLE DIE COST

FIRST...In Experience • In Know-how • In Research • In Quality • In Service

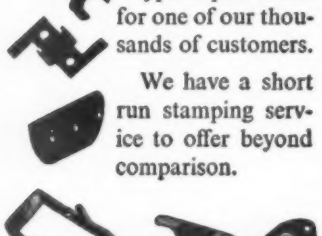
The sketch briefly describes the cost of a typical part made for one of our thousands of customers.

We have a short run stamping service to offer beyond comparison.

EXAMPLE

$63.20 for first 100 pieces including tools.

$5.20 for each additional 100 pieces plus material.

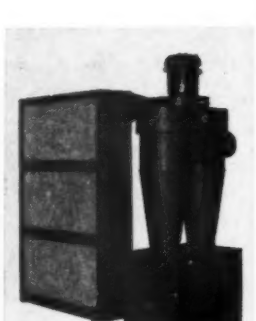


Factory trained representatives in all centers. Write for full details.

DAYTON ROGERS
Manufacturing Company
MINNEAPOLIS 7B, MINN.

CIRCLE INFORM-A-GRAM KEY NO. 1522

Small Diameter Carbide-Tipped End Mills with longer cutting life are now available. Nelco ¼" and 5/16" end mills have special heat treated steel bodies to prevent costly shank breakage. Additional shank rigidity reduces operational vibration. Nelco Tool Co., Inc., Manchester, Conn., or **Inform-A-Gram No. A17.**



Filtration Through Six "Throw-Away" Filters is a feature of an after-filtering mechanism. It was designed for Torit Model 219 FM-A cyclone-type dust collecting machine which collects dust, lint, chips, powders, and fumes in industrial plants. Depending on the particle's size and specific gravity, efficiency varies from 75 to 95%. Torit Mfg. Co., Dept. KP, 287 Walnut St., St. Paul 2, Minn. **Inform-A-Gram No. A18.**

Industrial Batch Ovens now have "Power - O - Matic" patented control systems which automatically proportion wattage in direct relation to operating temperature and work load. Straight line control is maintained throughout the entire oven range. The ovens are manufactured by Blue M Electric Co., 138th & Chatham St., Blue Island, Ill. **Circle No. A19.**

Abundant Die Area, unusual accessibility, and convenient work handling are the features of a modernized line of gap-frame, double-crank presses. The line consists of upright Series B and open-back inclinable Series

BI. The line is used for work involving long, progressive dies, multi-station dies, automatic feeds, and drawing operations. Niagara Machine & Tool Works, 683 Northland Ave., Buffalo 11, or — **Circle No. A20.**

For Arbor Spacers and Shims, Feeler Stock or Shim Stock . . .

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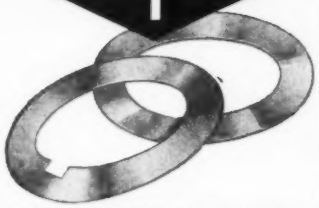

ARBOR SPACERS AND SHIMS • 20 arbor sizes ⅜" to 4" . . . 19 thicknesses .001" to .125". Specify with or without keyways. Also available—hardened and ground spacing collars (with standard keyway) ⅛" to 3" long in all popular sizes. (For use in milling, slitting and gang-saw setups, shimming gears and bearings).

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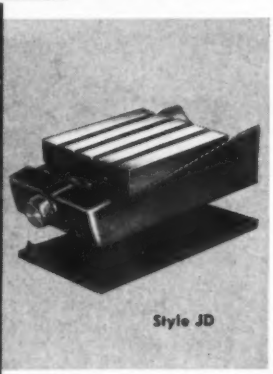
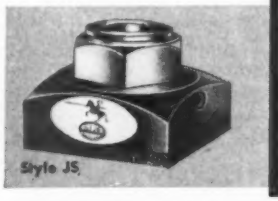

Style JD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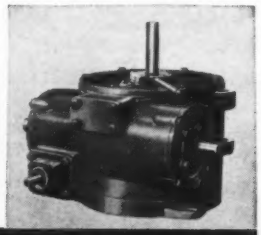

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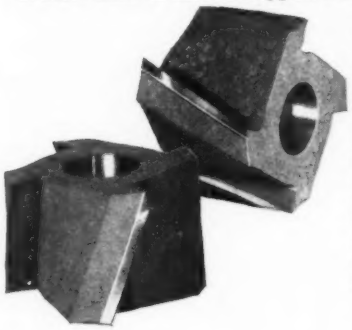
CIRCLE INFORM-A-GRAM KEY NO. 1542

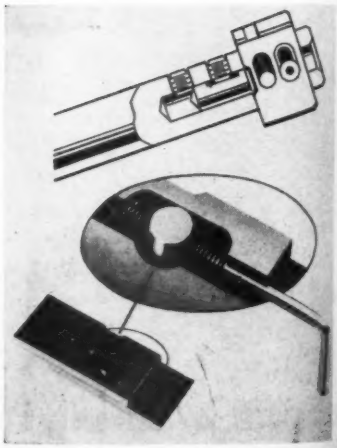
A New Line of carbide-tipped true spiral shaping cutters has been produced by Onsrud Cutter Mfg. Co., Libertyville, Ill. Six standard sizes are available and other sizes are made to meet individual requirements. They're used where the cutting edge thickness is extreme and where the stock is loose or fibrous grained. **No. A21.**



A Black Granite T-Slotted Surface Plate is ideal for jobs where jigs, fixtures, and precision instruments are used. The non-glaring, temperature inert, moisture repellent plate can be finished to accuracies of 0.000050"/in. Collins Microflat Co., Inc., 2326 E. 8th St., Los Angeles 21, or — **Circle No. A22.**

Drill, Chamfer, and Tap Holes automatically with a new drilling machine that combines the operations of three machines into one. The NATCO H-6 is an adjustable, multi-spindle driller and tapper with a 3-position automatic fixture slide. For additional information on this machine, contact The National Automatic Tool Co., Richmond, Ind., or — **Inform-A-Gram No. A23.**

New Maxwell Boring and Reaming Cutters feature a fully protected cutter adjustment. As shown, the micrometer adjusting screw is protected against wear and gall from chips. These tools have selective float control for reaming operations. For boring the cutter is locked in the bar to hold concentricity. The Maxwell Co., 386 Broadway, Bedford, O. **Circle No. A24.**



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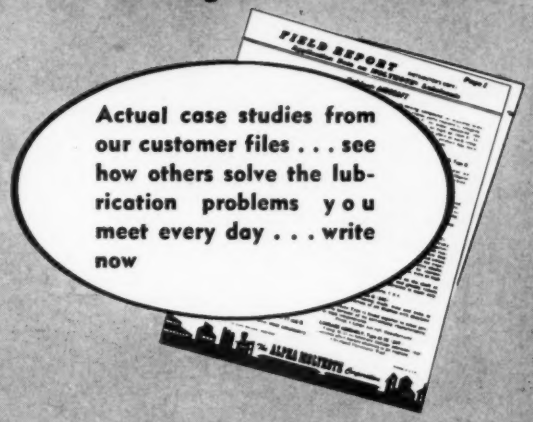
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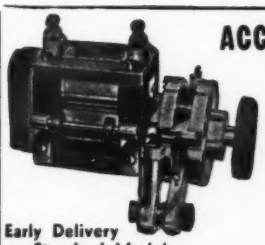

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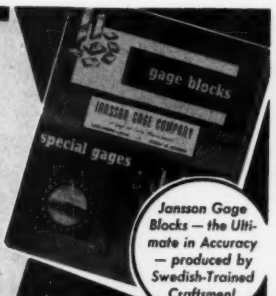

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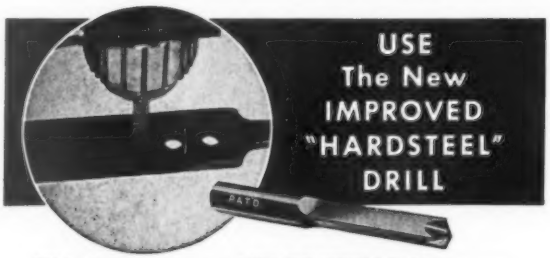

With the new, improved "HARDSTEEL" Drill, you can do accurate, smooth drilling, countersinking, counterboring and reaming in steels hardened by any process without first annealing the work. And they work with equal ease on work-hardening steels and high carbon–high chrome steels of any degree of hardness.

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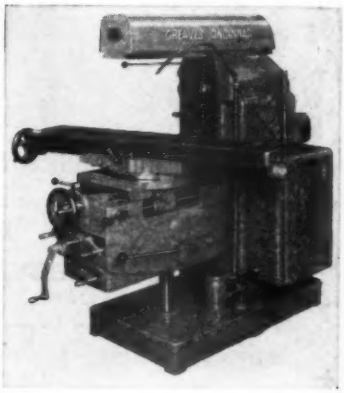

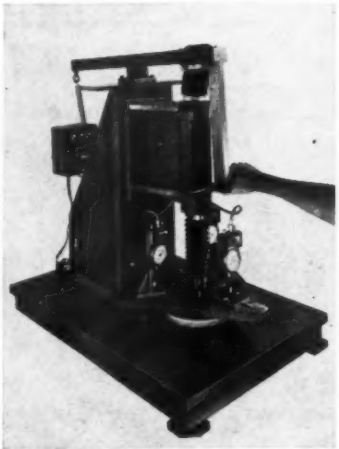

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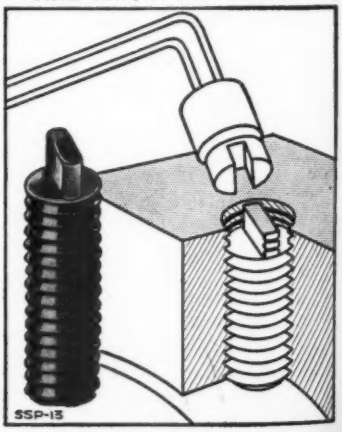

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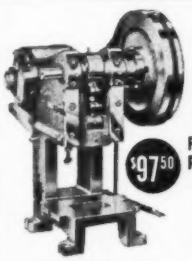

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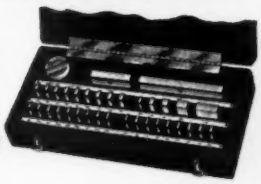

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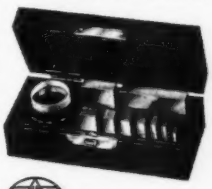

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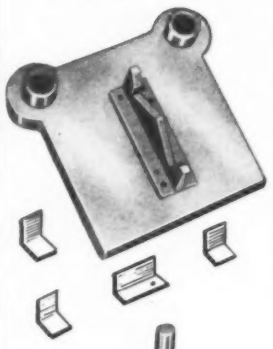
Punches and Dies

Angle Iron Cut Off Die



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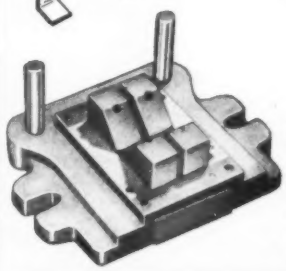

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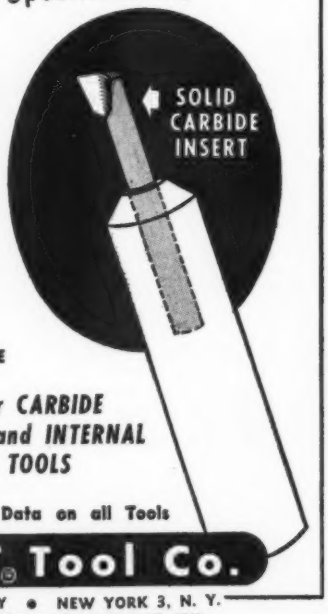

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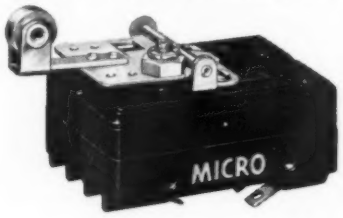
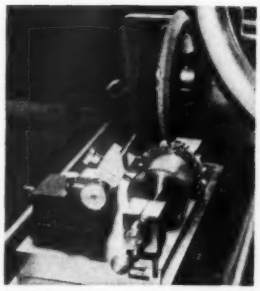
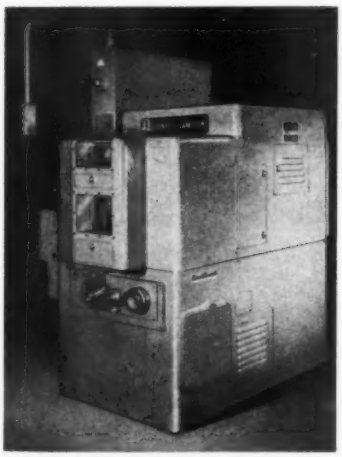
CIRCLE INFORM-A-GRAM KEY NO. 1582

A Single-Actuated Dual Switch has been designed for a wide range of industrial control and electronic applications. Low-force, double-pole Model 6AS13 can switch two isolated circuits at the same time. It's available with a variety of lever lengths, straight or formed levers, with or without a roller. Micro Switch, Div'n of Minneapolis-Honeywell Regulator Co., Freeport, Ill., or — **No. A29.**



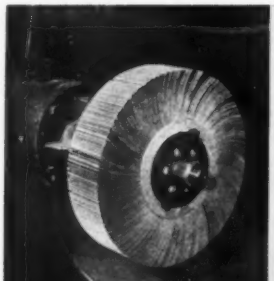
A Midget Bench Center is used for grinding index detents. The portable bench center with integral surface plate performs this fine grinding operation, without jigging, to an accuracy of 0.0005". It holds parts up to 5⅜" long and 3¼" dia. Weighing only 16 lbs, the bench center was developed by Transicoil Corp., Worcester, Pa. **Circle No. A30.**





A High Production Tap Grinder grinds standard tap sizes from 0 to ⅝" dia. Individual lead screws for each pitch have ⅛ the pitch of the thread being ground, for long screw life. Wheel trueing is automatic before or after a finish cut. Wheel sizes are 20", 18", or 16". Jones & Lamson Machine Co., Springfield, Vt., or — **Circle No. A31.**

Polish All Types of Metal for plating, painting, etc., without using fine grit set-up wheels, rag or sisal buffs, or brushes, with the new "PG" wheel. Made up of cloth-coated abrasives, it removes stock as part of the polishing action. The rate of cut and micro-inch finish



produced remain constant. Shown is a "PG" wheel on a lathe spindle, and being used for hand operations. Minnesota Mining and Mfg. Co., Dept. A5-266, 900 Fauquier St., St. Paul 6, Minn., or — **Circle No. A32.**

JACO LOW COST AUTOMATIC

STOCK REEL

COSTS NO MORE THAN STANDARD STOCK REELS

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3 SIZES – ALL WILL TAKE 6" WIDE STOCK.

24" diameter $85.00

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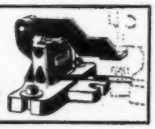
Guaranteed – money back if not 100% satisfied

New LOW prices on the JACO 3-inch and 6-inch SCRAP CHOPPER



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CIRCLE INFORM-A-GRAM KEY NO. 1591

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. . . with this versatile Temco bench furnace for heat-treating dies, parts, tools, etc.

STRONG STEEL BODY WITH ROUNDED CORNERS REINFORCED WELDED CONSTRUCTION
GUILLOTINE ACTION DOORS EASY TO OPEN BOTTOM SECTION ONLY OR BOTH SECTIONS AT WILL
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4 HEAVY GAUGE EMBEDDED TYPE ELEMENTS HEAT FAST AND EVENLY
CONTROLS AVAILABLE SEPARATELY OR WITH WIRED PANEL SHOWN
1700 SERIES

Speed production, lower unit costs with this husky electric furnace. Large enough to take a wide variety of work, yet compact and exceptionally convenient to use. Chamber sizes—9½" wide, 8½" high and 13½" or 18" deep. Heating range 350° to 1900° F., 220 V. operation. Price with controls, $323.50 to $569.00. Furnace only $235 to $297. Write for literature and nearest dealer's name.

TEMCO® ELECTRIC FURNACES

Thermo Electric Mfg. Co., 474 Huff St., Dubuque, Iowa

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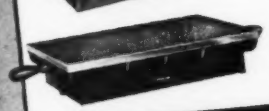
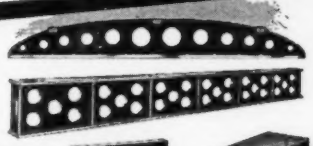
and be precision sure!

CHALLENGE SURFACE PLATES

New! Clovis Black Granite Rated Class A. Surface accuracy guaranteed. 24 sizes.



Special Analysis Semi-Steel Fine grain. Precision ground or hand scraped.



STRAIGHT EDGES for lathe bed ways. PARALLEL STRAIGHT EDGES for inspection of alignment.

UNIVERSAL BOX ANGLES Parallel to within .00025-inch.

V-BLOCKS V accuracy of .0005-inch.

ANGLE PLATES In 22 sizes for clamping & holding work.

BOX PARALLELS In every size for every use.

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GRAND HAVEN, MICHIGAN

DEALERS IN ALL PRINCIPAL CITIES

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actual size *
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here's proof you can save money on small lot stampings
*Illustrated is a close-tolerance stamping produced by the WLS Speed Tooling Method. Labor per piece was only 6¢; proportionately low prices apply to your problems . . . in any shape. Our dies average over 100,000 pieces.
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WLS STAMPING COMPANY
3283 E. 80th Street, Cleveland 4, Ohio

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WORLD'S HARDEST METAL

IMPROVED QUALITY

Additional refinements and improvements in our process have added still longer life to the wearing edges of Talide tools, dies and wear resistant parts. The result is a carbide having a new, unique grain structure with harder and tougher properties than previous grades. Laboratory tests reveal our improved grades possess 25% greater strength and rigidity. Service life per grind up to 50% longer than previous grades has been proven in grueling field tests.

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Write for Catalog 55-G

METAL CARBIDES CORPORATION MC TALIDE® YOUNGSTOWN 7, OHIO

HOT PRESSED AND SINTERED CARBIDES · VACUUM METALS
HEAVY METAL · CERMETS · HIGH TEMPERATURE ALLOYS
OVER 25 YEARS' EXPERIENCE IN TUNGSTEN CARBIDE METALLURGY

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When New Molds Stick use IMS SILICONE FLUID

For Better Tool and Die Lubrication!

Shorten costly break-in periods! Simply spray on this perfect parting agent from self-dispensing aerosol! Useful too in PATTERN MAKING — releases patterns from master molds with minimum surface defects. Remember . . .

WHERE ANYTHING STICKS it always pays to try IMS SILICONE SPRAY

Get new tools into production sooner. Keep a few cans handy all the time. Order today!

DELIVERED PRICES
Single Can $2.00
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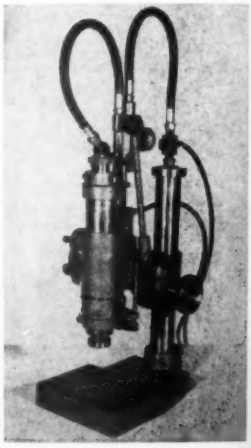
CIRCLE INFORM-A-GRAM KEY NO. 1602

A New Low Cost Multi-Wheel Numbering Machine is used for stamping all kinds of products and parts of light metals, unhardened steel, etc. Model 60 featuring a single locking pin to hold the wheel in perfect alignment is simpler in construction than Model 70. It's available with two to four wheels, in character sizes of 1/16", 3/32", or ⅛". The wheels have eleven divisions with engraved characters 0 to 9 with one blank space. Details on this lightweight machine are available from Numberall Stamp & Tool Co., Dept. TP, Huguenot Park, Staten Island 12, or — **Circle No. A33.**

A New Single Solenoid Pilot Operated Hydraulic Valve is used for automatic control of hydraulic circuits. It's a sub-plate type for panel mounting and is designed for 3000 psi. The valve features a full capacity rated at 3.6 gpm at 15 ft./sec. For full details on Model 6615 valve, write for Catalog 260, Rivett Lathe & Grinder, Inc., Brighton 35, Boston, or — **No. A34.**

A Variable Stroke Pneumatic Impact Machine has been announced by Heidrich-Nourse Co., 631 E. 3rd St., Los Angeles 13. Model 200-VS is a smaller version of Model 3-VS. It features accurate control of impact force, operator safety, and simplicity of setup. It's used for staking, crimping, coining, flanging, riveting, assembling, impression marking, impact shearing of plastics, etc. Impact range is from 0 to 8000 lbs, static or squeeze pressure. Maximum speed is 6000 cycles/hr. **Inform-A-Gram No. A35.**



Surface Roughness is quickly checked with a new hand-held comparator. Metal surfaces after milling, turning, etc., are compared with standard under 10-power magnification. Both the standard and the piece under study can be viewed. Bausch & Lomb Optical Co., 625 St. Paul St., Rochester, N. Y. **Circle No. A36.**

PARTS INTERCHANGEABILITY ASSURED WITH ANCHOR BUSHING DRILL TEMPLATES

Hole alignment for interchangeable access panels is assured through use of inexpensive Anchor Bushing drill templates on the FJ-4 Fighter production line at North American Aviation's Columbus Division.

Made from thin sheet metal or laminate plastics, Anchor Bushing drill templates are readily formed to match curved or oddly shaped contours. Simple construction, combined with inexpensive Anchor Bushings, provides accurate drill tooling for low or high volume work at a cost well under comparable drill jigs or fixtures.

Write for the Anchor Bushing Catalog for sheet metal and laminate plastic tooling techniques, types and sizes of Anchor Bushings and price list.

A FEW TYPES OF ANCHOR BUSHINGS

STANDARD NUT PLATE — FOR SHEET METAL TEMPLATES

DIAMOND KNURLED — FOR LAMINATE PLASTIC TEMPLATES

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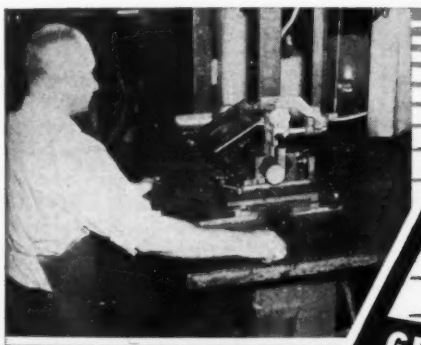
CIRCLE INFORM-A-GRAM KEY NO. 1611



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GREATEST COST SAVER IN METAL CUTTING

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CIRCLE INFORM-A-GRAM KEY NO. 1612

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HAND WHEELS
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BALL HANDLES
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Specify Tomco for long lasting dependability

A complete line of high grade hand knobs, handles, and hand wheels is available from Tomco. Immediate shipments are made from stock of standard items. Specialty items are made to your specifications.

For original equipment or replacement parts look to Tomco for quality and service.

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CIRCLE INFORM-A-GRAM KEY NO. 1621

MICRO-HEIGHT GAUGE

NO OTHER GAUGE COMPARES FOR FAST, ACCURATE LAYOUT AND MEASURING

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Capacities to 6″ when used with this GREIST 3″ Riser

The Micro-Height Gauge is a precision instrument, finished in satin chrome, which reads like a micrometer and measures from zero at base to 3″ in thousandths.

Use as a scriber for fast layout, or insert dial indicator for quick, accurate inspection.

Toolmakers, Layout men, and Inspectors do better work faster with Micro-Height Gauge.

Write for illustrated circular and prices.

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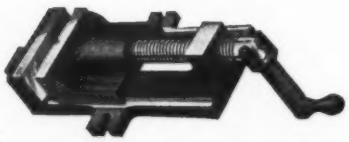
THE GREIST MANUFACTURING CO.
448 Blake Street
New Haven 15, Connecticut

CIRCLE INFORM-A-GRAM KEY NO. 1622



YOST DRILL PRESS VISE

• **This new Yost vise has been designed expressly for use on drill press operations. Does away with special and costly jig fixtures.**

OFFERED IN TWO SIZES

Vise No.	Width of Jaw, Inches	Opens Inches	Weight Pounds
1D	3½	4	12½
2D	5	5½	23

Do you need a vise of ANY type?
Write today for bulletin on the extensive Yost line

YOST MFG. COMPANY
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Cambridge Springs, Pa.

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COMPLETE THE DIE-SET AT YOUR BENCH

Lacey Die-Set Machine

Here's a truly "one man" press. It operates with one hand. Handy for tool and press rooms, it permits the diemaker to complete a die-set at his bench . . . saves toolroom and handling costs. Ask today for full details.

Sole Distributors
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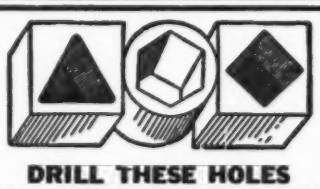

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BY A QUICK, EASY, INEXPENSIVE METHOD
Your business letterhead will bring literature.
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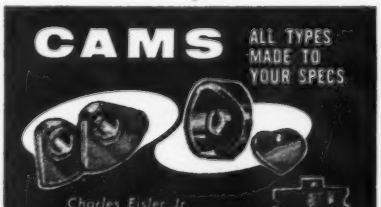
CAMS ALL TYPES MADE TO YOUR SPECS

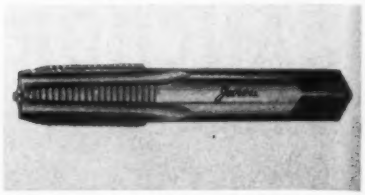


Charles Eisler Jr.
President

EISLER ENGINEERING CO., INC.
732 SO. 13TH ST. NEWARK 3, N. J.

CIRCLE INFORM-A-GRAM KEY NO. 1626

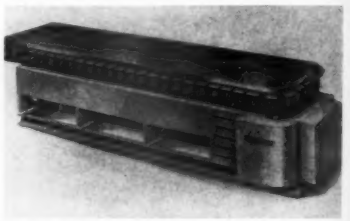
High Speed Steel Ground Thread Pipe Taps with standard hand tap shanks have been manufactured by Jarvis Corp., Middletown, Conn.



They fit any tapping machine or device and give closer control and improved precision in operation. They're stocked in four sizes, ⅛″-½″. **Circle Inform-A-Gram No. A37.**

A Machine That Automatically Slots, deburrs, and delivers up to 720 screws/min. has been introduced. The Roy Screw Slotter features simplified set-up; a removable, jamproof hopper; and an electronically controlled saw. Since a wide range of screws can be slotted, it can do the work of several machines up to four times faster. Roy Machinery & Sales, Inc., 5 New Britain Ave., Farmington, Conn., or — **No. A38.**

The "Auto-Tran" Unit, a basic straight line type indexing chassis, can be applied to automatic and semi-automatic assembly operations. It's designed with accessible faces for mounting various devices for drill-



ing, tapping, staking, etc. It has 48 to 72 carriers; 3″, 6″, 9″, or 12″ index travel; and vertical or horizontal mounting surfaces. Swanson Tool & Machine Products Co., Erie, Pa., or — **Circle Inform-A-Gram No. A39.**

Simultaneous Facing and Boring Operations can be performed by an automatic hydraulic facing unit. With it, any boring machine becomes a dual purpose machine. The capac-

ity of the Belock "hydro-face" extends to 6″ dia. pieces. Belock Instrument Corp., College Point, Queens, N. Y., or — **Circle No. A40.**

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AS FINE AS HIGHEST QUALITY MATERIALS,
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AT ALL TIMES; TO PROVIDE MAXIMUM SERVICE
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MANNER AS TO INSPIRE CONFIDENCE AND MAKE,
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AND TO JUSTLY WARRANT THE BUSINESS
WITH WHICH WE ARE FAVORED.
TO THIS END WE PLEDGE OURSELVES,
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ACE
DRILL BUSHING CO., INC.
5407 FOUNTAIN AVENUE
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CIRCLE INFORM-A-GRAM KEY NO. 1631

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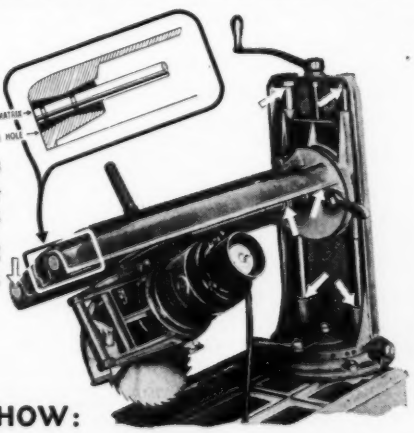


Slide Rods Anchored at ½ Cost of Machining for Drive Fits

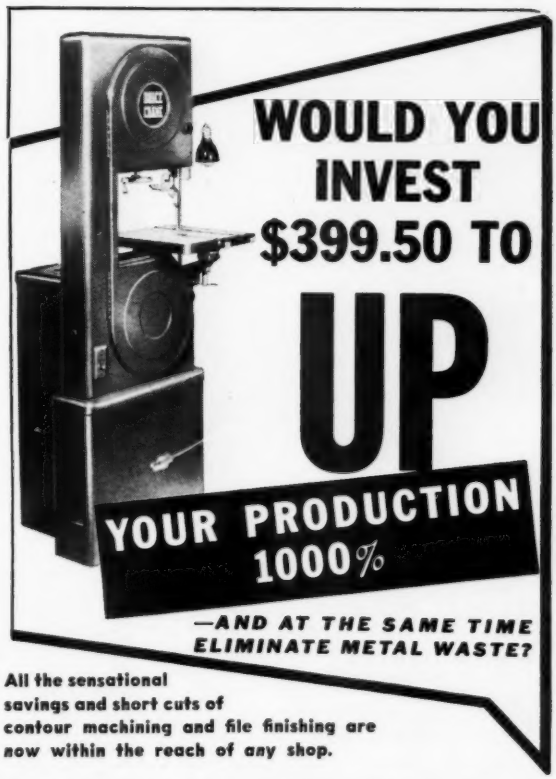
HERE'S HOW:

GROOVED slide rods were inserted in cored, oversize holes and aligned in a holding fixture. Cerromatrix was melted and poured in place. When frozen, Cerromatrix expanded to give a tight fit that exceeded the life of the machine. Proven by 20 years in service.

Find out how YOU can save money in anchoring bearings, bushings and non-moving parts in machine building by writing for Bulletin A1.

CERRO DE PASCO CORPORATION
316 Park Avenue, New York 5, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 1632



WOULD YOU INVEST $399.50 TO UP YOUR PRODUCTION 1000%

—AND AT THE SAME TIME ELIMINATE METAL WASTE?

All the sensational savings and short cuts of contour machining and file finishing are now within the reach of any shop.

BOICE-CRANE COMBINATION 14" CONTOUR SAW-BAND FILER-BELT GRINDERS

Perform all the operations of machines costing $1800.00, yet priced as low as $399.50!

Continuous precision cutting with no back-stroke. Slices away hard alloys and carbon steels in one-tenth the time required by slow milling, drilling, shaping and hand filing.

Produce maintenance parts, production parts, metal templates, special wrenches, wrench templates, cams, spiral parts, irregular shaped stacked parts and stamping, forming and trimming dies in minutes instead of hours. File broaching and flash removal in 1/9 the time required by hand ¼ the time required by reciprocating filing machines. Eight speeds 92 to 4100 f.p.m.

If you are using a large combination machine for both cutting and filing, consider the economy of having this Boice-Crane machine for filing only.

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963 CENTRAL AVENUE • TOLEDO 6, OHIO

Please send free literature on the Boice-Crane
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Longer useful life from cutting tools is one of the logical and proven ways for shops to economize.

For over 40 years we have served countless industries, restoring their damaged tools and re-cutting their worn tools for other operations.

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SEND US A TRIAL ORDER

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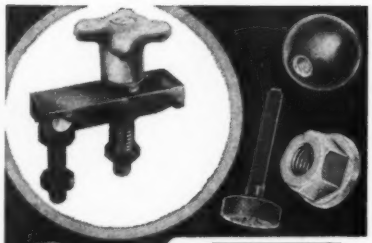
Write for this catalog describing our service.

NATIONAL TOOL SALVAGE

NATIONAL TOOL SALVAGE CO.
6511 EPWORTH BOULEVARD
DETROIT 10 MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 1641



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FIXTURE CLAMPS & DETAILS
Heat-treated and Corrosion Resistant
QUICK SERVICE
CATALOG AVAILABLE

HARCO ENGINEERING

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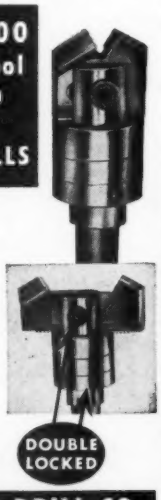
Telephone KEnwood 3 7799
CIRCLE INFORM-A-GRAM KEY NO. 1642

MAGNIFIES "Hard-to-Read" Vernier Scales on Height Gages and Calipers

MAGNIFIES the "hard to read" vernier scales on calipers and height gages. No more eye strain, guess work or hit or miss setting and reading. **LENS** is finest quality optical glass, specially designed and ground for the purpose with utmost optical skill. 4X magnification shows lines true and correct. In daily use in plants of Westinghouse, General Electric, General Motors, Chrysler, Packard, Ford, Boeing Aircraft, Bendix Aviation and many others engaged in defense work.
Made in 3 sizes to fit Starrett, Brown & Sharpe, Lufkin Tools, and others of similar design. **S No. 100** for 6" Vernier Calipers; **S No. 200** for 10"-12" Height Gages, also 10"-18"-24" Vernier Calipers; **S No. 300** for most popular type 18" and 24" Height Gages and for 36"-48" and 60" Calipers.
For Complete Information Write, Phone or Wire
STEBAR COMPANY
217 28th Ave. Minneapolis 11, Minn.
CIRCLE INFORM-A-GRAM KEY NO. 1643

SAVE $10,000.00 in perishable tool inventory with HAYDEN ADJUSTABLE DRILLS

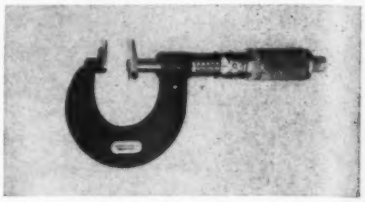


Only two ordinary drills, 1" and 2", needed in stock for hogging out metal. A Hayden Adjustable Drill will then cut the hole to its specified size. Adjustable drills come in two sizes, 1" to 2"; 2" to 4". Blades are high speed steel. Carbide tipped blades at extra cost. **Write for Literature and Price List.**

HAYDEN TWIST DRILL CO.
8628 Lyndon Ave., Detroit 38, Mich.

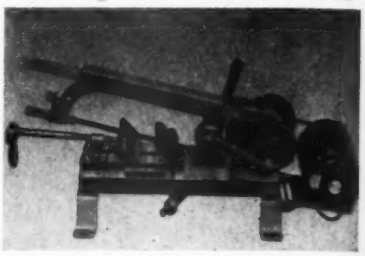
CIRCLE INFORM-A-GRAM KEY NO. 1644

Measure Gear Size by the "Span System" with a span micrometer. It measures Spur or Helical gears having an odd or even number of teeth, without the need for master gears



or accessory pins or balls. Model 1002 is designed for accurate measurement of medium-pitch gears. Sensory Devices Co., P. O. Box 204, New Vernon, N. J., or — **No. A41.**

A Small-Capacity Power Hack Saw will handle pipes or rounds up to 4" x 4" O.D., either on a straight or 45° angle cut. Either 10" or 12"

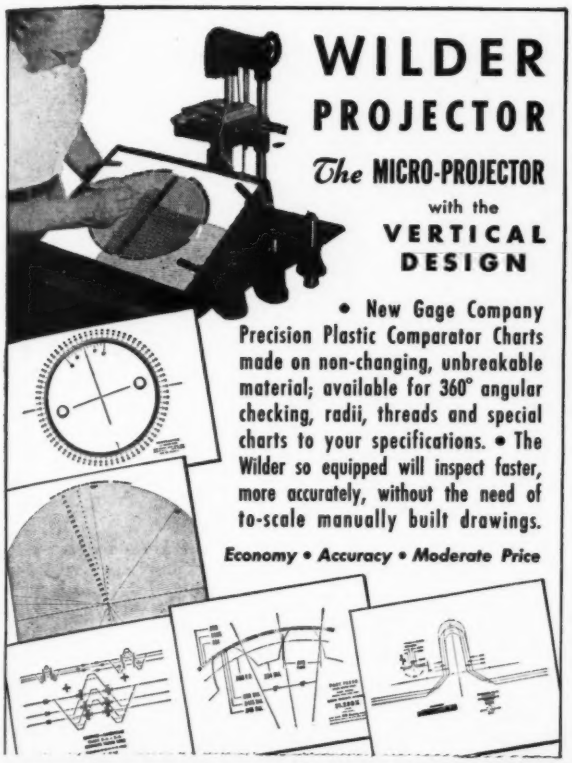


blades may be used. Details on the Jefferson 601 saw will be furnished by the manufacturer, Sales Service Machine Tool Co., St. Paul, Minn., or **Circle Inform-A-Gram No. A42.**

Precision Mass Production and Prototype Work is handled by a new vertical miller and jig borer. It features 12 spindle speeds ranging from 80 to 3450 rpm and a guaranteed accuracy of ± 0.00025. Model MC-1 is ideal for jig boring, drilling, vertical milling, or fly cutting to a fine surface finish. Linochine Products Corp., 145 — 42nd St., Brooklyn 32, or — **Circle Inform-A-Gram No. A43.**

Designed For Economical Checking of small parts and limited application in the measuring field is a portable bench-type projector. Model 8 is for horizontal or vertical projec-

tion gaging. Six magnifications, 10x-100x, are provided. Eastman Kodak Co., Special Products Sales Div'n, Rochester 4, N. Y., or — **Circle Inform-A-Gram No. A44.**



WILDER PROJECTOR

The MICRO-PROJECTOR with the VERTICAL DESIGN

• New Gage Company Precision Plastic Comparator Charts made on non-changing, unbreakable material; available for 360° angular checking, radii, threads and special charts to your specifications. • The Wilder so equipped will inspect faster, more accurately, without the need of to-scale manually built drawings.

Economy • Accuracy • Moderate Price

Geo. SCHERR OPTICAL TOOLS, Inc.

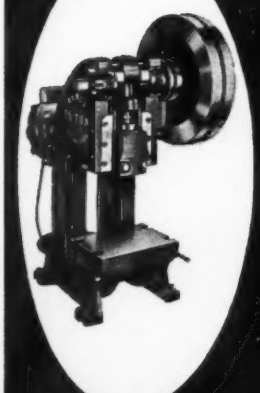
200 -T LAFAYETTE STREET • NEW YORK 12, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 1651

KENCO

1½ TO 15 TON

PUNCH PRESSES



PRECISION-BUILT FOR FAST, TROUBLE-FREE PRODUCTION

Here at last is a complete line of small punch presses built to big press standards. You get rugged construction throughout . . . minimum need for adjustments . . . minimum downtime . . . capacity far beyond the ratings . . . steady, economical production.

Write for literature and engineering data.

Trouble-free crankshaft has no weakening slots . . . eliminates driving dog breakage. One-piece, alloy steel construction.

Flywheel driving plate is hardened and ground, assuring long wear and positive drive—a quality feature exclusive with KENCO presses.

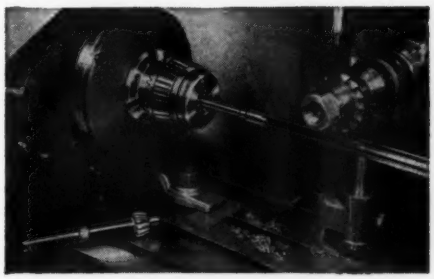
KENCO MANUFACTURING CO.

Mfrs. of Precision Machinery and Accessories

5211-B Telegraph Road
Los Angeles 22, California

CIRCLE INFORM-A-GRAM KEY NO. 1652

HERE'S HOLDING FOR PRECISION MILLING



DO YOU NEED THIS KIND OF GRIP?

The splines being milled in this steel are precisely spaced, thanks to the Hartford Super-Spacer and the Jacobs Model 96 Rubber-Flex Collet Chuck holding the stock. The Model 96 is the most accurate collet chuck in the world, with a gripping power unmatched by any split steel collets.

We would like to hear from you if you have any holding jobs that require this kind of accuracy and grip. The Model 96 holds any piece from 1/16" to 1⅜" in diameter, and with only 11 collets for the full range.

For complete details see your industrial distributor, or write The Jacobs Manufacturing Co., 2611 Jacobs Road, West Hartford 10, Conn. Ask for Bulletin 54-CC.

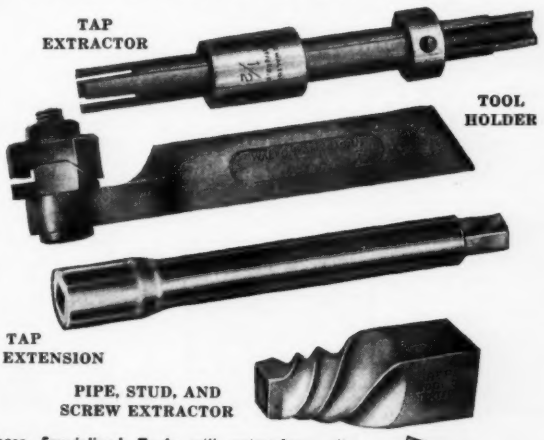
Jacobs CHUCKS

If it's a Jacobs—it holds

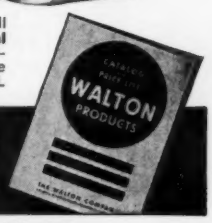
CIRCLE INFORM-A-GRAM KEY NO. 1653

WALTON *Specialized* TOOLS

TIME AND MONEY SAVERS



These **Specialized Tools** will outperform all ordinary tools and methods in doing one **special** job particularly well. Send for complete bulletin and price list No. 38, describing these tools and giving details of liberal FREE TRIAL offer.



The WALTON Company
HARTFORD 10, CONN.

CIRCLE INFORM-A-GRAM KEY NO. 1654

Here's Where You Measure Value

It's the quality of the production you get from a South Bend Lathe that is the measure of its value. Consistently close tolerances month-after-month regardless of the job mean a better end product for you, less scrap and lower costs. Use this yardstick when you compare lathes and you'll see why you get more value for your money in a South Bend. For complete information contact our distributor. If none nearby, write to factory.

ILLUSTRATED: 10" x 3' bed Underneath Motor Drive Bench Lathe, priced at $1208 f.o.b. factory, less electrical equipment and tooling. Convenient time payment terms available. Only 3¼% annual interest on original unpaid balance due.

A NEW CATALOG shows all South Bend lathes 9" — 16-24" swing, 14" drill presses, 7" shapers and pedestal grinders. Ask for General Catalog 5406.

Compared with our costs
OUR PRICES ARE LOWER
than they were back in 1941
WAGES UP
155%
MATERIALS UP
131%
PRICES UP ONLY
49%
Prices are closely tied to costs. Costs are still rising. Buy now before increased costs necessitate higher prices.

SOUTH BEND LATHE
SOUTH BEND 22, INDIANA
Building Better Tools Since 1906

SOUTH BEND LATHES

CIRCLE INFORM-A-GRAM KEY NO. 1661

PREIS-PANTO ENGRAVER

- Ratios from 1.7-1 to 7.1
- Areas at 2:1 ratio —45/16" sq. 4½" circle
- Areas at 7:1 ratio —1⅛" sq. 1⅜" circle

A high precision, sturdily constructed, widely adaptable machine for engraving steel stamps, dies, other metals, plastics, fibre, wood, etc.

By simple attachment of additional accessories this machine may also be used for ELECTRICAL MARKING and ACID ETCHING.

Several models available for 2 and 3 dimensional engraving.

Write for NEW Bulletin B-2 of the complete line and ask for catalog UE-3 with price lists.

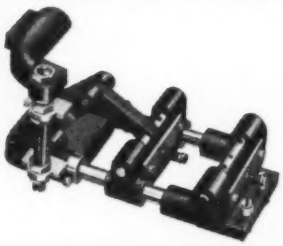
Trade Mark PANTO

For immediate attention write directly to manufacturer below. Ask for nearest representative.

H. P. PREIS Engraving Machine Co.
647 U. S. Route 22 Hillside, N. J.

CIRCLE INFORM-A-GRAM KEY NO. 1662

A SURE FEED



PRODUCTO AUTOMATIC "SUREFEED"

Your pressroom can produce more with this compact, durable hitch feed. Can be mounted right on die set to save you time. Direct linkage feeding affords greater accuracy. Comes in 2" and 3" sizes. Write for detailed bulletin on this cost-cutter.

THE PRODUCTO MACHINE CO.
970 Housatonic Avenue
Bridgeport 1, Connecticut

CIRCLE INFORM-A-GRAM KEY NO. 1663

CAMS

To Your Specifications

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— Except Screw Machine Cams —

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Design Assistance Offered

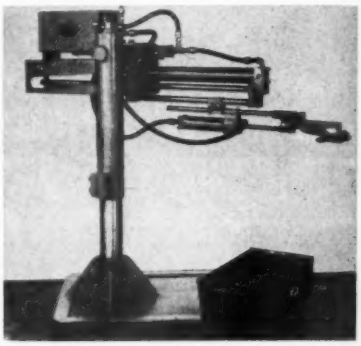
KIDDE PRECISION TOOL CORPORATION
10 Locust Ave., Roseland, N. J.

CIRCLE INFORM-A-GRAM KEY NO. 1664

A Plastic Steel, "Devcon," reduces tool costs up to 90%. It's used for making tools and small fixtures, repairing dies, buffing and assembly, etc. Consisting of 80% steel particles

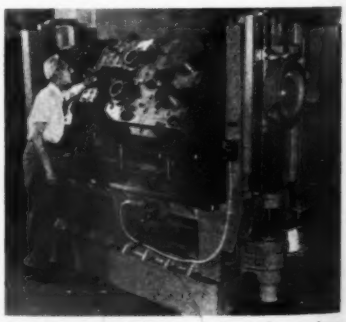
and 20% plastic, it's available in two types—"Devcon A," a putty, and "Devcon B," a viscous liquid. The photo shows "Devcon" being poured from its container. Chemical Development Corp., 162 Endicott St., Danvers, Mass., or — **Circle No. A45.**

An Automatic Portable Press Unloader features a swiveling base for side or back unloading. Series 3000 Iron Hand can be used with back-geared presses where gearing prohibits mounting standard overhead



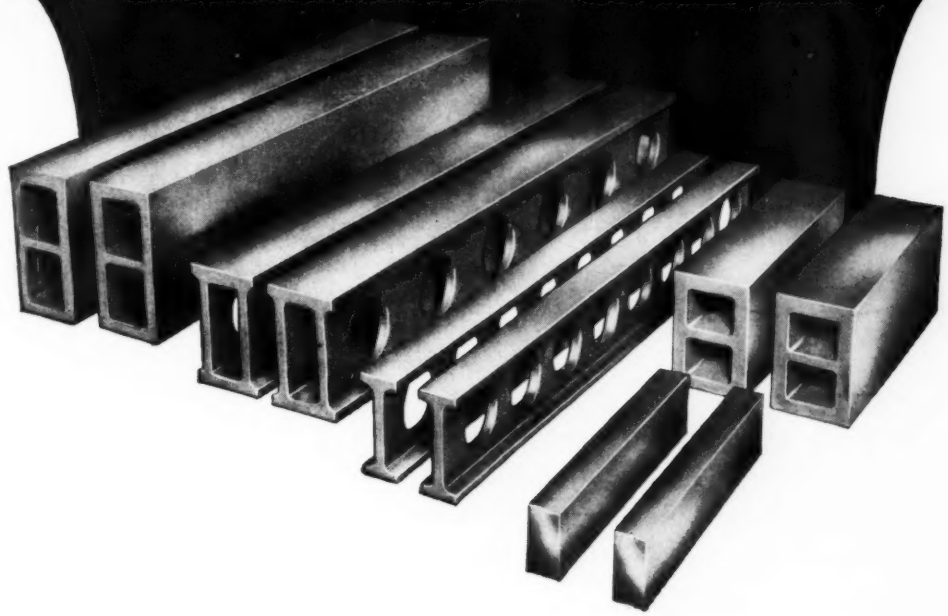
Iron Hands. This adjustable unloader is ideal for job shop use. Since the jaw travel is in a straight line, small parts can be removed at high speeds. Sahlin Engineering Co., Inc., P. O. Box 289, Birmingham, Mich. **Circle Inform-A-Gram No. A46.**

A New Die Handler handles dies or molds 36" x 75", weighing up to 6000 lbs. Under power, its top platen rises at the rate of 12"/min. and



can be rotated by an electric motor. Model 1014 is manufactured by Hansford Mfg. Corp., 1239 University Ave., Rochester 7, N. Y. **No. A47**

Tool Room AND INSPECTION ACCESSORIES



FOR PARALLELS, straight edges, master squares, surface plates and angles, MEEHANITE® METAL has been and still continues to be one of the most valuable and versatile materials ever developed. While many of these items can be used in the "as cast" condition, a simple heat treatment can provide hardnesses of from 250 to 650 Brinell to greatly increase wear, life and stability.

Permanent Stability however, is the most valuable feature —easily obtained at a reasonably low price.

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East 75th & Morgan Avenue • Cleveland 27, Ohio • Phone MI 1-8400

EQUIPPED FOR HEAVY, MEDIUM OR LIGHT JOBBING PRODUCTION
HEAVY JOBBING MACHINE SHOP—METALIZING

CIRCLE INFORM-A-GRAM KEY NO. 1665

Cleveland Group Names Cornish as Executive Director

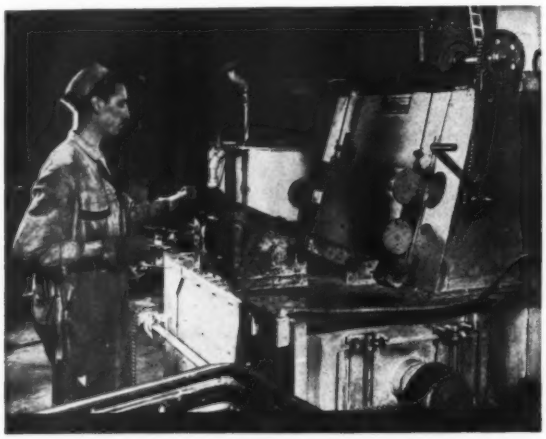
The appointment of Donald H. Cornish to the newly created position of Executive Director of the Cleveland Engineering Society was announced recently by Society President Warren H. Chase.

Mr. Cornish has been with the Society since 1949 as managing editor of "Cleveland Engineering," a weekly technical and industrial news publication. For the past four years he has been responsible for the Society's publications, publicity, public relations, and program.

The Society, now in its Diamond Jubilee year, annually sponsors technical education programs, conferences, and inspection trips.

The new Executive Director now serves as Secretary of the Society and of its Board of Governors and is responsible for all operations of the organization and its buildings.

Previous to joining the Society, Mr. Cornish was with the advertising and public relations departments of White Motor Co. and International Harvester Co.



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THE *Lakeside way*

Electronic Induction Hardening, Carbonitriding, Flame Hardening, Heat Treating, Bar Stock Treating and Straightening (mill lengths and sizes), Annealing, Stress Relieving, Normalizing, Pack, Gas or Liquid Carburizing, Nitriding, Speed Nitriding, Aerocasing, Chapmanizing, Cyaniding, Sand Blasting. Laboratory Physical Testing.

THE *Lakeside Steel Improvement Co.*
5418 LAKESIDE AVE., CLEVELAND 14, OHIO HENDERSON 1-9100
METAL TREATING INSTITUTE

CIRCLE INFORM-A-GRAM KEY NO. 1666

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for Tool and Plant Engineering needs call ENdicott 1-1560
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TOOL DIVISION:
Drills, Taps, Carbide Tools, Rotary Files, End Mills, Milling Cutters, Diamond Wheels, Air & Hydraulic Cylinders, Valves & Controls, Machinery & Equipment.

PUMP & FILTER DIVISION:
Pumps, Filters, Electric Switches & Controls, Calibrating Tanks & Separators, Gauges, Thermometers, Compressors, Safety Tools, S.S. or Alloy Tanks & Vessels.

TELCO
TRUMAN E. LONGLEY CO.
4030 SUPERIOR AVENUE
CLEVELAND 3, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 1667

Steel Cutting Carbide Grade Jumps Tool Life

By switching to a new grade of steel cutting carbide and a different type of tool holder, tool life was increased while machining single throw Arma steel crankshafts in the amount of from 85 pieces to an average of 200 pieces per cutting edge.

Initially, Wessonmetal Grade 26 solid carbide inserts replaced steel cutting carbides formerly used on old style clamp-type holders after increasing production from 85 pieces to an average of 140 pieces per grind. Because of special insert grinds required with this old style holder, the inserts permitted only one cutting edge per grind.

These holders have now been replaced with special band-type Multicuts which provide four cutting edges per grind. In the new holders, Grade 26 is producing a total of 1,000 crankshafts per grind for a total of 200 pieces per index.

Turning of single throw crankshafts with Grade 26 Wessonmetal has jumped tool life from 85 pieces to 200 pieces per grind over all other steel cutting carbides tested. Rough and finish turning of the crankshaft is being done in one pass.

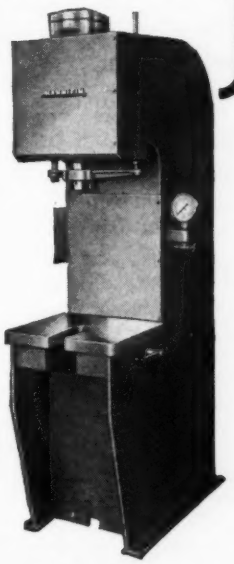
The operation, being performed at the Clinton Machine Company, Maquoketa, Iowa, consists of rough and finish turning the fly wheel and pulley ends of the 220 Brinell steel crankshafts. The rough and finish operation is being done in one cut on a 20 hp New Britain GF tracer lathe at 1210 rpm and .014" feed. Average depth of cut is from ¼" to ⅜". The operation is being run dry.

Part of the increase from 140 pieces with Wessonmetal 26 in the old style holders to 200 pieces per index with the new Multicuts is attributed to the combination of a hardened steel clamp used with the standard locking band on this holder.

In machining the crankshafts, the holder goes through two out-facing operations and the addition of the top clamp provides maximum rigidity of the insert which aids in extending tool life.

PRICE LIST

ON HANNIFIN STOCK HYDRAULIC PRESSES



1-TON	$ 552
2-TON	$ 627
5-TON	$1,286
8-TON	$1,581
10-TON	$1,855
25-TON	$3,681

Prices complete with motors and starters F.O.B. our press plant, St. Marys, Ohio, subject to change without notice.

DELIVERY FROM STOCK

Demand for these popular presses is so consistent we are able to produce them in quantity and pass the savings along to you.

Construction-wise and quality-wise these small general-purpose presses are identical to the larger Hannifin presses, up to 150 tons. Special, optional controls when needed.

WRITE for complete information on the Hannifin Hydraulic Press you're interested in.

HANNIFIN

HANNIFIN CORPORATION, 563 S. WOLF ROAD, DES PLAINES, ILLINOIS

CIRCLE INFORM-A-GRAM KEY NO. 1671

"IMPERATOR"

PARALLELS and "V" BLOCKS

The Jewel of Magnetic Accessories

Pat. Pend.

PARALLELS

CODE	SIZE	MATCHED PAIR*
IP2	1x2x2	$16.50
IP3	1x2x3	19.50
IP4	1x2x4	22.50

"V" BLOCKS

CODE	SIZE	MATCHED PAIR*
IV2	1¾x2½x2	$22.50
IV3	1¾x2½x3	33.75
IV4	1¾x2½x4	45.00

*Includes hardwood box

Also available for Hanchett Magna-Lock Chucks at slightly higher price.

NOW AVAILABLE IN SETS!

SET No. 1
1 pr. Matched IP4 ..... $22.50
1 pr. Matched IV2 ..... 22.50
COMPLETE with plywood box $41.60

SET No. 2
1 pr. Matched IP3 ..... $19.50
1 pr. Matched IV3 ..... 33.75
COMPLETE with plywood box $49.00

SET No. 3
1 pr. Matched IP4 ..... $22.50
1 pr. Matched IV4 ..... 45.00
COMPLETE with hardwood box $61.60

GROVER SAYLE CO.
PV DIV., P.O. BOX 6715, CLEVELAND 1, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 1672

WALLS TU-WAY BELT SANDER

Full 1/3 h.p. G. E. Motor

USE IT EITHER WAY

At last, a top quality industrial sander that provides all the most wanted features — yet sells for so little.

complete with cord, plug, switch ready to use

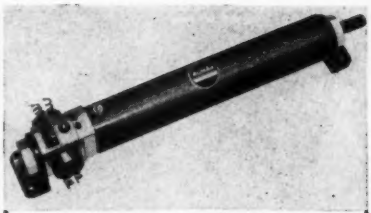
$89.95

Illustrated Literature on Request

A few desirable distributor territories still available.

WALLS SALES CORPORATION
333 Nassau Avenue Brooklyn 22, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 1673



Model SVE valve-in-head Allen air cylinder. Electrically operated; single air inlet; 8 or 110 volts.

Pays its way with the air it saves!

Compressed air costs money. Conventional cylinders are fed that air through separate, remote valves. When, with each stroke, the air is ejected from the lengths of connecting hose or piping, your dollar loss is something to be concerned about!

The valve-in-head ALLEN AIR Cylinder prevents this waste. This self-contained power unit, with its built-in valve, *eliminates* cumbersome hose or piping; a single hose is the only hook-up needed.

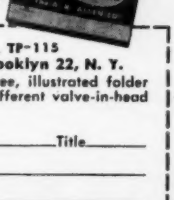
The air it saves is just *one* of the ways the ALLEN AIR Cylinder pays for itself . . . For pneumatic operation of equipment, the ALLEN AIR Cylinder gives the engineer a unit whose advantages add up to improved production, lowered costs. Its features include:

1. 4-way directional valve.
2. Separate speed controls for advance and retract strokes; these controls are an integral part of the cylinder itself.
3. 4 bore sizes: 1⅛", 2", 3" and 4".
4. Single air inlet.

The electrically-operated model shown is just *one* of 8 different valve-in-head ALLEN AIR Cylinders that pay their way with the air they save.

THE A. K. ALLEN CO.
Agents in Principal Cities
57 Meserole Ave., Brooklyn 22, N.Y.

FREE! For complete information write for illustrated folder today.



THE A. K. ALLEN CO. TP-115
57 Meserole Ave., Brooklyn 22, N. Y.
Please send me your free, illustrated folder containing data on 8 different valve-in-head ALLEN AIR Cylinders.

My name _____ Title _____
Company _____
Address _____
City _____ Zone ____ State _____

CIRCLE INFORM-A-GRAM KEY NO. 1674

You take no chances when you choose.....

ROUSSELLE

...for it has the speed, accuracy and sturdiness you want—also the features to handle a greater variety of work—along with simpler, more thrifty operation and maintenance...Dollar for dollar you cannot buy a better, more practical press.

Significant savings are often achieved if you let our engineering staff assist you. There is no obligation.

O. B. I. PRESS

HORN PRESS

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Rousselle Presses are sold exclusively through Leading Machinery Dealers

Rousselle Presses are manufactured by

SERVICE MACHINE CO. 2310 West 78th Street • Chicago 20, Ill.

CIRCLE INFORM-A-GRAM KEY NO. 1681

REID QUALITY TOOL-ROOM ACCESSORIES AT MODERATE PRICES!

SCALLOPED

LONG SHANK With Wrench Hexagon

PRONG

CAST IRON KNOBS

Made in three types as illustrated and a wide variety of sizes. Designed to improve appearance of product. Well proportioned with eye appeal. Made of fine grain cast iron. Smooth finish. No sharp edges. Can be supplied drilled and tapped and drilled and reamed when desired. Low prices.

FREE! NEW 60 PG. CATALOG

Many Other Items

Get our low prices for plastic and steel ball handles, machine handles, compression springs, file handles, compound rests, etc.

REID TOOL SUPPLY CO. Muskegon Heights, Mich.

CIRCLE INFORM-A-GRAM KEY NO. 1682

HARDENED and GROUND HSS BLANKS

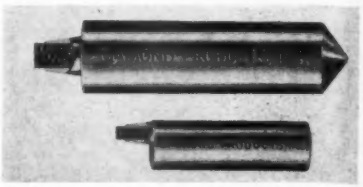
Any decimal diameter to ⅜"—in any length.
Mirror finish surface to gage tolerance.
Many uses—
—core pins, punches, gages, ejector pins, insert pins, special tools, etc.—Quick delivery.

Write or phone MIllburn 6-4222 for price list D-3

WILLIAM T. HUTCHINSON CO.
P.O.B. 328, UNION, N. J.
Factory: Springfield, N. J.

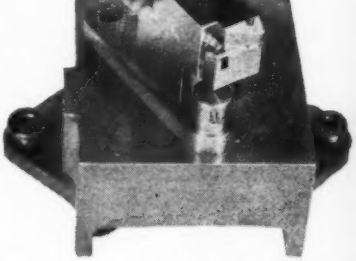
CIRCLE INFORM-A-GRAM KEY NO. 1683

Diamond Impregnated Tools have been designed for dressing thread grinding wheels. They're available in all types of holders for machines that grind sharp "V" or straight line



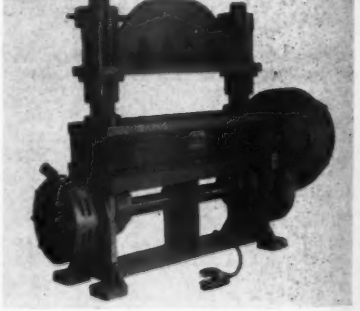
threads. The protruding diamond impregnated matrix offers a cutting face in any direction. Diamond Products, Inc., 326 Prospect Ave., Elyria, O., or — **Circle No. A48.**

A Crankshaft Drill Point Grinding Fixture offers an accurate method of grinding crankshaft points at a rate of 300 drills/hr. It's for drill sizes from No. 50-5/32". The "crankshaft point" on twist drills is used for deep



hole drilling and for drilling stainless and tough alloy materials; and in the aircraft industry for drilling aluminum, stainless, and heat treated parts. Schumacher Industries, 15500 Surrey, Livonia, Mich., or — **No. A49.**

An Air Clutch and Air Brake are now available on the Multi-Max punch presses produced by Diamond Machine Tool Co., 5111 Coffman-Pico Rd., Pico, Calif. Shown is the



No. 5036 press with the clutch and brake attached. Used with an air clutch, the air brake is free from drag. With the air clutch, the press is safer and quieter. **Circle No. A50.**

Drill More Holes Per Hour
In ANY Pattern . . .
On ANY Drill Press

with a *Adjustable* MULTI-DRILL

DRILLS 2 to 8 HOLES at ONE STROKE

Increase production up to 800% . . . save time, cut costs. MULTI-DRILLS make *any* drill press produce *more*. Attached without alterations or special tools. Quick, easy setups of universally adjustable spindles give you more flexibility . . . wider application. Handles any hole pattern within 9" circle; centers close as ¼". Extension Spindles available to increase working area to 22½". Special adaptations available.

model 900

DRILLS ANY HOLE PATTERN

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Product of *Commander* . . . Builder of Production Tools

CIRCLE INFORM-A-GRAM KEY NO. 1691

FORD CLEVELAND FOUNDRY USES CADDY® TOGGLE CLAMPS

CLOSE UP OF TYPE V-1 CADDY TOGGLE CLAMP

CADDY Toggle Clamps are used on the FORD Cleveland Foundry core wash operation in the manufacturing of FORD and MERCURY engine castings.

The FORD Foundry turns out castings for both FORD Engine Plants in Cleveland and high production equipment is essential.

Prior to the adoption of the CADDY Toggle Clamps, FORD tested the clamps for 6 months. The key feature in the selection of CADDY was that they maintained uniform clamping pressure throughout the life of the clamp and developed no springing or wobble.

CATALOG ON REQUEST

CADDY TOGGLE CLAMPS
Erico Products, Inc.
2070 E. 61st Place • Cleveland 3, Ohio
IN CANADA: ERICO INCORPORATED, 3571 Dundas St., West, Toronto 9, Ontario

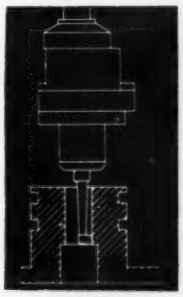
CIRCLE INFORM-A-GRAM KEY NO. 1692

A Boring Head That Won't Face is NOT Complete

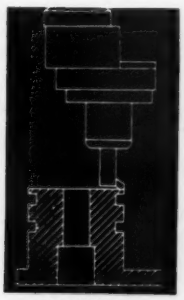
CHANDLER-DUPLEX Does ALL IN 1 SET-UP

BORING
FACING
TURNING
GROOVING
UNDER-CUTTING

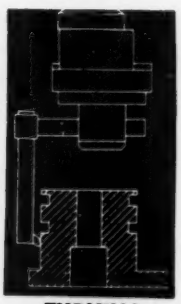
The **CHANDLER-DUPLEX** Combined Boring and Facing Toolhead has many features not found in ordinary makes . . . such as power feed for facing, longer slide travel, extremely fine adjustment, tee slot positioning of cutting bar, universal range and adaptability.



BORING

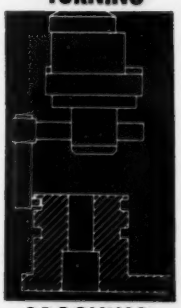


FACING



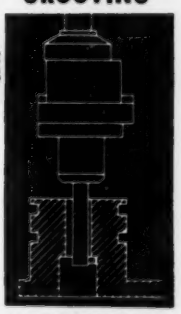
TURNING

CHANDLER-DUPLEX *combines* boring and facing — permits all these operations in one set-up. Built for efficiency, accuracy and stamina.



GROOVING

A Model for Any Size Machine



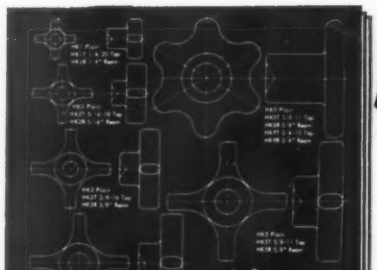
UNDERCUTTING

Write today for full details and Catalog on this combined Boring and Facing Toolhead

CHANDLER TOOL CO.
Muncie, Indiana

COMBINED BORING & FACING TOOL HEADS
Chandler-Duplex

CIRCLE INFORM-A-GRAM KEY NO. 1693



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WARDWELL "50 F" AUTOMATIC UNIVERSAL
Flute Grinder

SHARPENS AT LOWEST COST

Taps, Saws, Reamers, Woodruff Key Cutters, Milling Cutters.

Grinds straight flutes, spiral points, and sharpens saws in gang.

Takes saws from ½" to 8" diameter, in gangs up to 3¾" long — automatically indexes. Takes reamers down to 1/16" diameter.

No special skill needed. Wardwell 50 F starts making money for you the very first day.

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WARDWELL
Manufacturing Co.
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Maker of Largest Line of Saw and Tool Sharpening Machines

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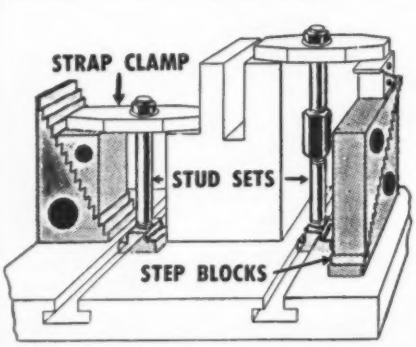

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STEP BLOCKS

Clamping tools of all types.

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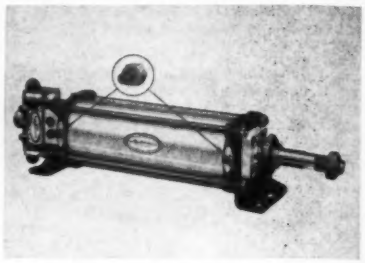
Box 277
North Main St., Englewood, Ohio

CIRCLE INFORM-A-GRAM KEY NO. 1703

Reduce Tool and Die Breakage with a mechanical overload detector, the "Protectron". This electronic device measures the load within a machine and warns when the load increases above a preset value of mechanical overload. The "Protectron" is discussed in Bulletin 70-105 from Sperry Products, Inc., Danbury, Conn., or — **Inform-A-Gram No. A51.**

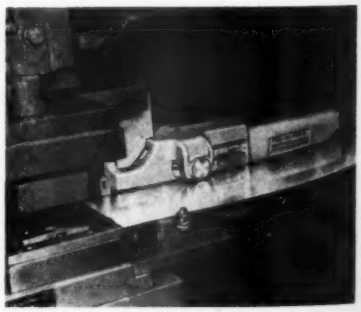
A 2½" Bore Air Motor with adjustable cushioning at either or both ends has been added to the Bellows line. It features built-in 4-way valve



and speed controls. Operating at air pressures up to 175 psi, the motor develops a thrust equal to five times the pressure applied. The Bellows Co., Akron, O., or — **Circle No. A52.**

Extra Strength and Safety are given to high speed abrasive wheels by a web backing of spiral wound rayon auto tire cord. Simex Red Wheels are lightweight, rigid type reinforced resinoid bonded abrasive wheels for portable disc and right angle type portable grinders. They're used for grinding welds, removing flash and bead, cleaning up rough ragged surfaces and edges, etc. They're made in depressed center or raised hub shapes in 7" and 9" dia. by 3/16" and ¼" thicknesses. Read all about Simex Red Wheels in Bulletin ESA-244 from Simonds Abrasive Co., Philadelphia 37. **No. A53.**

Accurately and Rapidly Feed highly polished and pre-plated material with embossed design surfaces with Dickerman die feeds and "Rol-Di-Feeds". For critical applications,

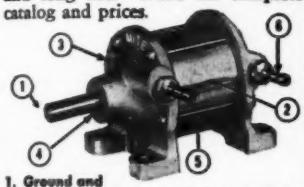


they may be equipped with neoprene or rubber covering. H. E. Dickerman Mfg. Co., Springfield, Mass., or — **Circle Inform-A-Gram No. A54.**

AIR-MITE AIR CYLINDERS

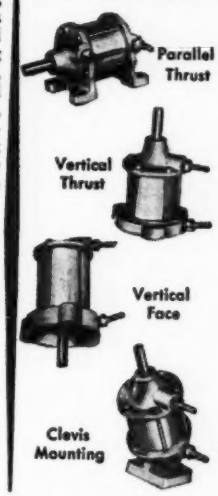
Low Cost . . . Compact . . . Powerful . . . Rugged

AIR-MITE Cylinders—made in single or double acting series—in 4 mounting types, are high quality cylinders at a low price. Simple, rugged design and compact construction give them long life, permit easy mounting on jigs, fixtures, tools, or machines. Used wherever power holding, pushing, pulling or lifting is required, AIR-MITE cylinders will meet your most exacting standards of dependability and long life. Write for complete catalog and prices.



1. Ground and polished steel ram
2. Brass, true-bore cylinders
3. High strength aluminum alloy cylinder heads
4. Bronze oilless ram bushing
5. Five steel tie rods
6. Brass hose stems

4 Mounting Types



AIR-MITE Devices, Inc.

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CIRCLE INFORM-A-GRAM KEY NO. 1711

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Grawell craftsmanship is inherent in Grawell Solid Carbide Tools . . . years of experience is reflected in the precision and long service life of these fine drills, end mills, reamers, grinding tools, centerlaps and burrs.

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BOREMASTER

Finished holes 1½" to 11¾" diameter to a depth of 8" on your present equipment

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THE BOREMASTER

Not just another Trepanning Cutter but a real heavy duty tool. Stock removed in one piece eliminating waste. TIME SAVINGS + MATERIAL SAVINGS = COST SAVINGS

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SPECIFICATIONS

- *Stands 5' high x 36" square at base — lifts off 10" high ash pan.*
- *12 bushel burning capacity*
- *Made of Armco rust-resistant aluminized steel (molten aluminum bonded to steel).*
- *Complete with ash pan base and grate.*
- *Needs no auxiliary fuel.*
- *Shipped completely assembled—weight 165 lbs.*

ALSTO COMPANY

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*ULTRA PRECISION BUSHINGS . . .

For gauge assemblies, flow orifices, wire drawing dies, etc. Guaranteed accuracy to .0001 in bores up to ⅜" long.

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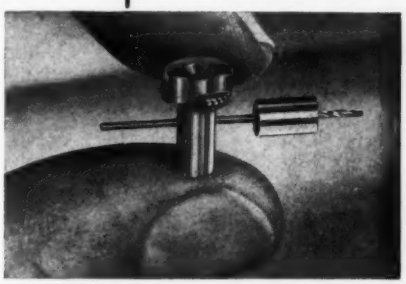
With Micro Drill Guides



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LONGER LIFE

No counter bore . . . diamond lapped hole with full length drill bearing.

Also Available

- Special Micro Drill Guides with body sizes other than those listed and hole sizes not in the standard #80 to 3/32" range.
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IS NOW MADE OF STAINLESS STEEL THROUGHOUT
AND THE FOLLOWING IMPROVEMENTS HAVE BEEN ADDED
• HARDENED PHOSPHOR-BRONZE adjustable gib retains accuracy
• SPECIALLY LONG VERNIER to read thousandths
• 3 GRADUATIONS - 1/1000" - 1/128" 1/10 mm in back
$14.75 PPD
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PRESS ROOM EQUIPMENT
WIRE STRAIGHTENERS
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MOTOR DRIVEN STOCK STRAIGHTENERS
For all thin materials. Entering rolls power driven; top rolls are individually adjustable for stock thickness. Available in eight sizes.
SWEEP GUARDS
A positive safety guard on power presses. Easily installed. Downward motion of ram removes operator's hands. Rugged—withstands jarring impact of press. Needle bearings in guard housings assures long life.
Write Now for new catalog showing prices and complete line of Equipment.
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TWIST DRILLS — REAMERS
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MAKERS OF "REPUBLIC," "CENTURY," "CELFOR" AND "U. S. EAGLE" BRAND TOOLS
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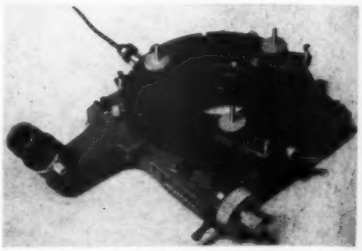
A Self-Contained Industrial X-Ray Machine operates on its own gasoline engine. Power and cooling assembly, master control, cable and hose reels are in one unit. It may be moved to any location and operated without any outside connection. Triplett & Barton, Inc., Burbank, Calif. **Inform-A-Gram No. A55.**

A High-Precision, Moderately-Priced 8" Optical Rotary Table is now available from George Scherr Optical Tools Inc., 200 Lafayette St., New York 12. It's used in small precision machine tools such as jig borers, and



also for difficult inspection setups on surface plates. A spacing accuracy of 30 seconds of arc is maintained because indexing is from an optical master circle. **Circle No. A56.**

A New Series of Colmonoy alloy powders reduces as much as 10% deposit efficiency when used in Spraywelded hard-facing applications. This means that less powder is needed. Spraywelding is faster than rod methods for overlaying surfaces with hard-facing alloys. Powders of the nickel-chromium-boron alloys provide wear, corrosion, heat, impact, and galling resistance. Full details on Powders 4, 5, and 6 are available from Wall Colmonoy Corp., 19345 John R St., Detroit 3, or — **Circle No. A57.**

Unusual Versatility is demonstrated by a standard straight line, multiple station transfer machine in meeting the needs of an automotive manufacturer. Shown is the Trans-O-Mator Type "A" formed by combining two standard units. It's used

for versatility of assembling operations, inspections, measurements, and testing, and Type "B" is for high speed production. Ferguson Machine & Tool Co., Inc., P. O. Box 5841, St. Louis 21, Mo., or — **Circle Inform-A-Gram No. A58.**

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Try CROBALT Tools — because:

CROBALT cast alloy cutting tools outwear and outproduce HSS . . . withstand shock and vibration far better than carbides . . . give 15% to 35% more pieces per grind than other cast alloys! They've been proven through 23 years in the largest metalworking plants; and today they're better than ever. Try them and see!

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describes the conditions where cast alloy tools are BEST — and tells how to use them to full advantage. In it, you may find the way to higher production at lower cost. Write for *Bulletin 101*.

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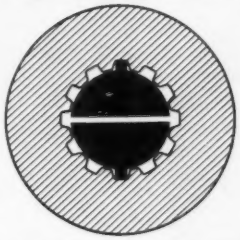
CIRCLE INFORM-A-GRAM KEY NO. 1731

FOR GAGING SPLINE ROOTS
Both Odd and Even Tooth



With modifications standard Comtorplugs solve many spline gaging needs including pitch diameter or clearance.

State your problem - - let us help.

COMTORPLUG with interchangeable expanding plugs to gage simple or special bores from ⅛" to 8" dia.

UNIQUE ADVANTAGES

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- Indicates actual size, a fixed—not passing—reading.
- Positive 2-point gaging — automatic centering.
- Shallow holes, deep holes, inside splines, open-end holes gaged easily.
- Detects ovality, back or front taper, bell mouth, barrel shape.
- Reaches to bottom of blind holes
- Gages work while still held in chuck.
- A shop tool for all-day every day use.
- Portable — no wires, hoses or stands.

Investigate the gage used by the thousands in jet engine, guided missile, farm machinery, automotive transmission, household appliance, and other volume-precision plants. IT MAKES PRECISION GAGING EASY . . . at machine . . . at inspection bench . . . for selective assembly. No other like it — investigate and see why.

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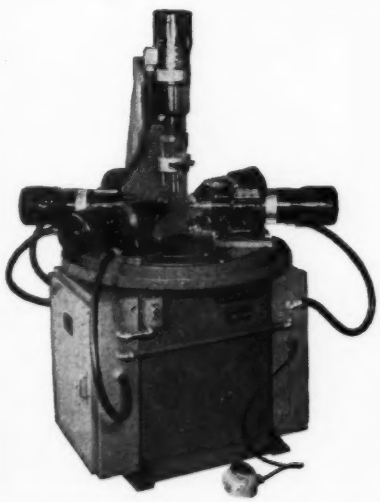
CIRCLE INFORM-A-GRAM KEY NO. 1732



Standard machine equipped with a standard vertical bracket

7 HOLES AT ONCE
WITH A
STANDARD RADIAL
HOLE DRILLING MACHINE

Why build a special machine for drilling radial holes when a standard machine equipped with Govro-Nelson Automatic Drilling Units will, in many cases, perform the work of a special machine that would cost considerably more!

Any number of drilling units up to eight may be employed the units being movable not only through 360 degrees on the circular table but also movable endwise on riser plates to meet the requirements of the part being drilled.

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If you are interested in reducing the cost of your radial drilling and tapping operations, write for price and dimensional data.

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Automatic DRILLING UNIT

GOVRO-NELSON CO.
Machinists of Precision Parts for 32 Years
1933 ANTOINETTE DETROIT 8, MICH.

CIRCLE INFORM-A-GRAM KEY NO. 1733

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WILLEY'S TUNGSTEN CARBIDE TOOLS

For **PROFIT PRODUCTION** and **LONG, NON-STOP** runs... Willey's Tungsten Carbide Tools best meet the demands of Modern Automation.

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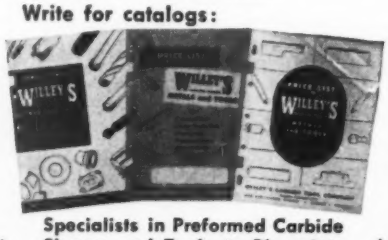

Specialists in Preformed Carbide Shapes and Tools to Blueprints

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★ **"TRU-LOC" Adjustable Adapter Sleeves & Nuts**

★ **A. S. A. DRILL JIG BUSHINGS**

★ **A. G. D. PLUG & RING GAGES**

Always in stock to assure you immediate delivery.

Ask about our prices for salvaging your worn-out plug and ring gages.

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VARIABLE SPEED STOCK STRAIGHTENERS

Portable cabinet units in sizes 6" up to 24". Constant or variable speed drives with forward, reverse and cut-out switch. Five, seven or nine straightening rolls. Pinch rolls and all bottom straightening rolls power driven.

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CIRCLE INFORM-A-GRAM KEY NO. 1743

Automatic Profilometer Equipment sorts parts according to micro-inch surface roughness, measured along an O.D. or flat surface, including tapers and parts with grooves or shoulders. With the equipment shown, the contact meter is set to

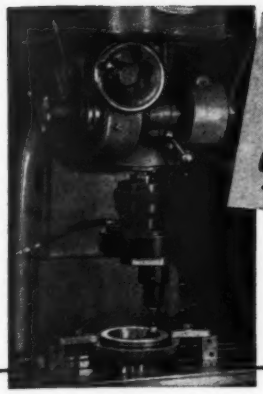
the high roughness limit and parts that rough or rougher are rejected. Each application is engineered to individual requirements. Micrometrical Mfg. Co., 345 S. Main St., Ann Arbor, Mich. **Circle No. A59.**

A Miniature Bench Center checks small part concentricity. It's used for checking and machining tiny parts, and measuring tool wear, chamfer angles, etc. This portable center holds pieces up to 5⅜" long and 3¾" dia. within 0.0005" accuracy. Transicoil Corp., Worcester, Pa., or — **Inform-A-Gram No. A60.**

Retrieve Lost Parts or identify magnetic and non-magnetic materials with the Leigh Permanent Magnet. It will also hold parts for assembly and remove loose metal from holes. This powerful pocket magnet is used

by tool and gage makers, machinists, patternmakers, etc. These Leigh magnets, No. 434, costing $1.00 each, can be ordered directly from the manufacturer, Spring Specialty Co., 25 N. 5th Ave., Maywood, Ill.

Horizontal, Angular, and Vertical Milling plus boring and drilling on one machine without attachments is possible with the new Van Norman 16S Ramtype Miller. It features the Quill adjustable cutter head with a 4" quill travel. It's designed to increase production and reduce costs in the tool room, machine shop, pattern shop, and on the production line. Van Norman Co., 3640 Main St., Springfield 7, Mass., or—**No. A61.**

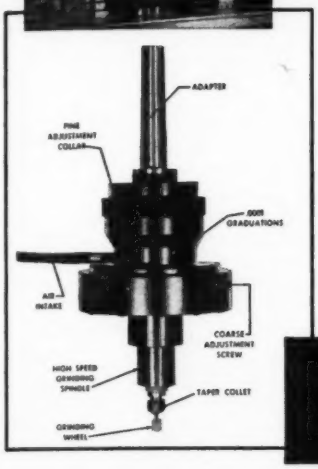


Grind Precision Holes *without* STOPPING the SPINDLE

You can save a lot of time in precision grinding with Grind-A-Matic, the new air-driven head. Unlike other comparable units, radial feed may be increased in increments of .0001" as grinding proceeds. You don't have to stop the spindle every time. Just turn the adjustment collar.

Used as a tool in any jig bore, boring mill, lathe or vertical mill, it gives you high production with the precision of a jig grinder.

Grind-A-Matic grinds holes ⅛ to 2½ inches in diameter with standard equipment. An auxiliary mounting arm increases this range to 4 inches.



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Hydraulic presses made to conform to J.I.C. standards. Pictured at right is 15-ton hydraulic press.
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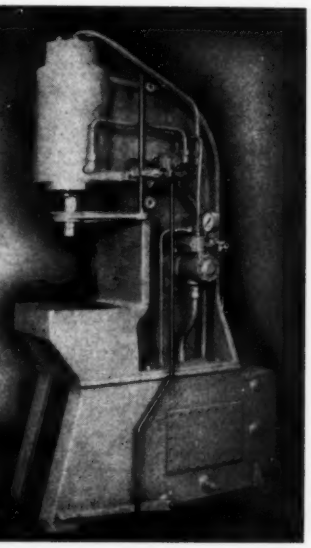

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Large Precision Machining
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We Have
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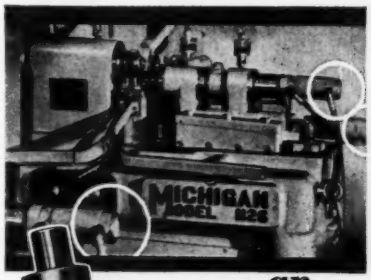
CIRCLE INFORM-A-GRAM KEY NO. 1754

O-M
CYLINDERS
(air and hydraulic)



. . . an important part of the automation picture at

MICHIGAN TOOL COMPANY

O-M cylinders (shown here installed on an automated speeder) are an integral part of "Gear-O-Mation" at Michigan Tool Company. In their automatic gear production line, O-M cylinders provide the muscle in the movement or holding of parts.

Important factors in Michigan Tool's choice of O-M cylinders for these machines were: *COMPACTNESS OF DESIGN* — their cleaner, more streamlined construction that allows installation in less space; *LESS MAINTENANCE* — easier to clean, inspect, remove, disassemble and service, if necessary, with no special equipment or skills needed. Knocks out downtime, keeps loading equipment in continuous operation.

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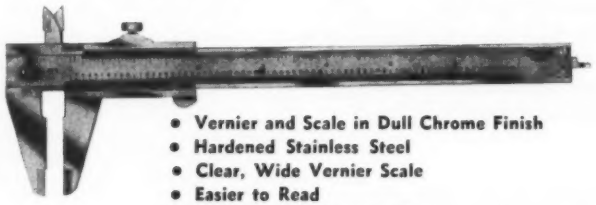
NEW . . . ETALON No. 17



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THE KOCH TEST INDICATOR

IS THE ONLY TOOL MAKERS INDICATOR ON THE MARKET WITH TWO WORKING ENDS, FOR PRECISION WORK, ONE END TO TEST OUTSIDE SURFACES, THE OTHER INSIDE.

What Every Tool Room, Tool Maker or Machinist Needs.

Plunger moves away from, instead of against the lever, protecting delicate parts from sudden or excessive jolts. Each graduation on scale represents 1/1000" movement of plunger. $10.00 plus postage.

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Ask your dealer for these tools and buy through him. If he cannot furnish them, Write to us.
American Patent, Made in U. S. A. according to Standard Law.

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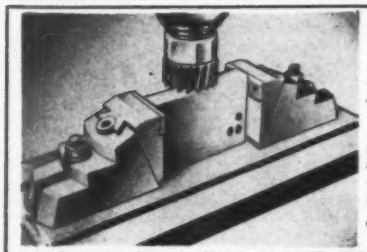

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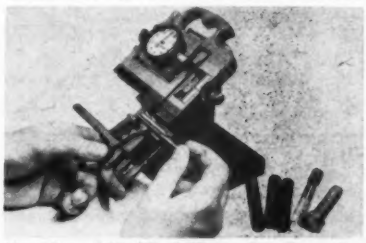
has been added to the line of machine vises, rotary tables, and milling attachments produced by Chicago Tool and Engineering Co., 8383 S. Chicago Ave., Chicago 17. **No. A62.**

A Lead Checker utilizes a "Versa-Dial" gage and jaws with "V" edges. The jaws stocked are suitable for pitches from 10 to 40 threads/in. and diameters up to 1" for American Na-



tional and Unified Threads. Jaws for finer or courser threads can be supplied. The instrument has an accuracy of 0.0001". Standard Gage Co., Inc., Poughkeepsie, N. Y. or **No. A63.**

Six Types of High Speed Jobbers, letter and wire gauge drills, have been developed by Whitman & Barnes. Shown are Hercules all-

purpose drills; Blue Diamond for deep hole drilling; and Fastwist for drilling deep holes in aluminum, magnesium, zinc, etc. Also illustrated are Slowtwist drills for drilling bakelite, brass, molded plastics, etc.; Brytwist; and Boltwist for bolt and cotter pin drilling. Whitman & Barnes, Div'n of United Drill and Tool Corp., Plymouth, Mich., or — **Circle Inform-A-Gram No. A64.**

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TRADE MARK REG. U.S. PAT. OFF.
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FOR MIRROR-BRIGHT RESULTS
LIKE THIS...

Originally devised for use in the Parker plant, Phoenix Brand non-scaling compound is now used throughout industry for the safe, sure protection of heat treated steels hardening up to 1650°F. This dry, easily handled powder is sprinkled on. It then forms a hard air-tight shell during the heat treating process. As the atmosphere is sealed out—scale, pitting or decarburization is impossible—and every piece emerges from the furnace clean and shiny. There are no rejects! No hours of costly polishing! Furnace capacity is materially increased with the elimination of cumbersome packs. Protective shell breaks off when water quenched; a short boiling in plain water removes coating when oil quench is used. Phoenix Brand non-scaling compound is recommended for use in *all* furnaces except bath type.

2 lb. can $ 6.00
5 lb. can 15.00
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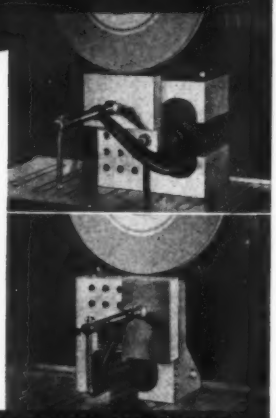

Will Grind A Work Piece Square The Easy Way Without Skilled Help

Designed for grinding a work piece to exact squareness, whether it be a component of a jig, fixture, gauge, or die; eliminating an indicator, precision square, surface plate, and use of top skilled help on routine jobs. Can also be used on layout work and inspection. This precision tool is built of high grade steel, stabilized, hardened and ground. ALL WORKING SURFACES ARE GUARANTEED TO BE SQUARE within two-tenths of a thousandth . . . (.0002). Write for complete literature describing other outstanding features.

Note adjustable set edge and recess for C-clamp. ➔

FEDERAL MACHINE TOOL COMPANY, EMMETT STREET, BRISTOL, CONNECTICUT

CIRCLE INFORM-A-GRAM KEY NO. 1781

new FORD
SOLID CARBIDE
END MILLS

Here are a few examples of Ford's new line of solid carbide end mills. The line includes styles with 2 or 4 flutes — straight or spiral. Available with square or ball ends. Tapered body mills are also standard. All Ford mills are machine ground . . . to give uniformly accurate flute form and a constant relief angle. That's your assurance of longer life, smoother finish and faster cutting.

new bulletin
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Rotary FORD Tools

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YES Send me Bulletin on new line of solid carbide end mills.

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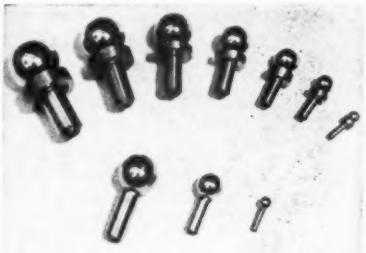
CIRCLE INFORM-A-GRAM KEY NO. 1782

Tooling Balls are available with and without locating shoulders. With a plain shank, they're called fixture balls and are built into jigs and fixtures. These balls are accurate to ± 0.0001" on size. Checking balls have



a reference shoulder and are used for inspection purposes. They're made to ± 0.00002" on size. Types 224 and 448 are produced by Industrial Tectonics, Inc., Ann Arbor, Mich. **Inform-A-Gram No. A65.**

Increased Speed plus uniform pressure on the work regardless of shape, without expensive fixtures, is possible with the Fenlind Speed Surfacer. Model 16, a coated-abrasive belt-type surfacer, produces a true, finished starting surface on rough castings. It features a magnetic platen and a simplified work-turning device. Pressure is adjustable from 0 to 185 psi, allowing a choice of cutting speeds. Fenlind Engineering Co., 5602 Pike Rd., Loves Park, Ill., or — **Circle Inform-A-Gram No. A66.**

A Deep-Throat Punch features powerful toggle action and swiveling head. The head or handles can be rotated 360°. The Whitney-Jenson No. 15 punch has a capacity of ¼"

round hole through 16-ga. mild steel. Extra punches and dies form 1/16" to 9/32" in sixty-fourths are available. Whitney Metal Tool Co., Rockford, Ill., or — **Inform-A-Gram No. A67.**

Quickly and Accurately Center Any Hole from ⅛" to 15/16" dia. with the Universal Transfer Punch. It's a valuable tool for transferring centers from a single pattern or template to any number of duplicates without layout and scribing. Universal Transfer Punch Inc., Box 412, Massillon, O., has descriptive literature, or — **Inform-A-Gram No. A68.**

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FOR ANY MACHINING JOB
WE'LL PROVE IT WITH A FREE DEMONSTRATION!
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Employs New Vibra-Forge Principle!
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3/4" CAPACITY
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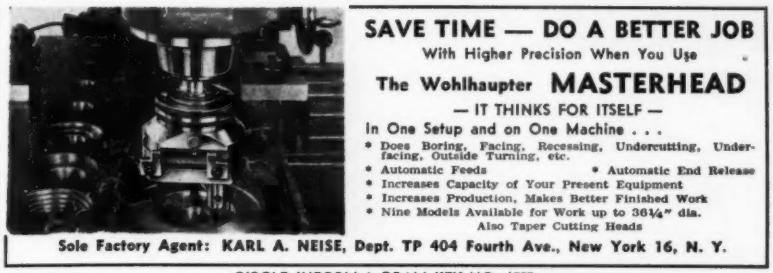
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In One Setup and on One Machine . . .
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CIRCLE INFORM-A-GRAM KEY NO. 1796

VACUUM MELTING FOR INVESTMENT CASTING

The first vacuum melting furnace designed specifically for the investment casting process has been put into operation on an experimental and pilot production basis by Austenal Laboratories, Microcast Division, at its Dover, N. J., plant.

Introduction of vacuum melting to investment casting is expected to extend considerably the versatility of the process, permitting the use of a wider range of alloys and insuring greater strength and ductility of alloys now being used.

Specifically, the melting of metals in a vacuum eliminates harmful gases, and undesirable oxides and slag compounds. The appearance of these elements in a standard melting process has limited the choice of alloys used in investment casting to those that are not affected or affected only slightly by these factors.

Although vacuum melting is being used in the investment casting process for the first time, it is already widely used in other segments of the metals industry, such as in casting

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45,000 taps, between sharpenings . . . another outstanding case history of savings possible with COLE CARBIDE TAPS. Tapping a 1.6-20 L. H. class 2 thread in high-silicon aluminum alloy die castings, advantages were: Less Sharpening and Setup Time . . . Less Inspection Required . . . Increased Cutting Speeds.

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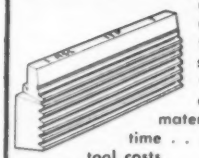

Carbide Taps and Chasers provide many times the wear of steel taps and chasers, when properly used on recommended materials. They cut "down" time . . . save on perishable tool costs.

NOT RECOMMENDED FOR USE ON STEEL

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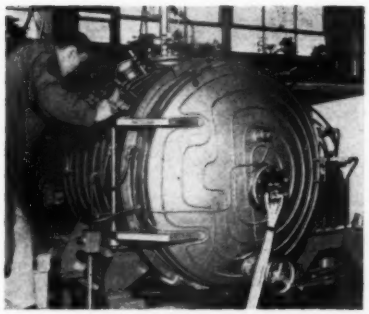

nickel ingots for the electronics field, in the production of high carbon bearing steels, and in melting high temperature wrought alloys, that normally suffer high oxidation loss.

The investment casting process is used primarily to mass produce small precision parts in a wide range of alloys, ranging from the high strength, high temperature alloys, through the stainless steels, to the carbon and low alloy steels. The furnace shown installed at Austenal was supplied by Naresco Equipment Corp. of Newton Highlands, Mass.

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*Model shown is 4" size No. 400S.

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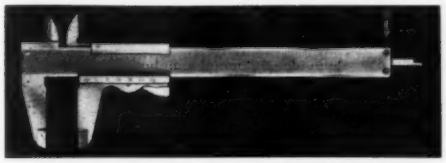
DOUBLE LENGTH VERNIER CALIPER

Measures 6" • Also Used As Depth Gage



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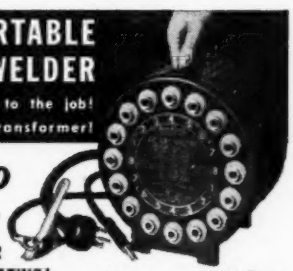

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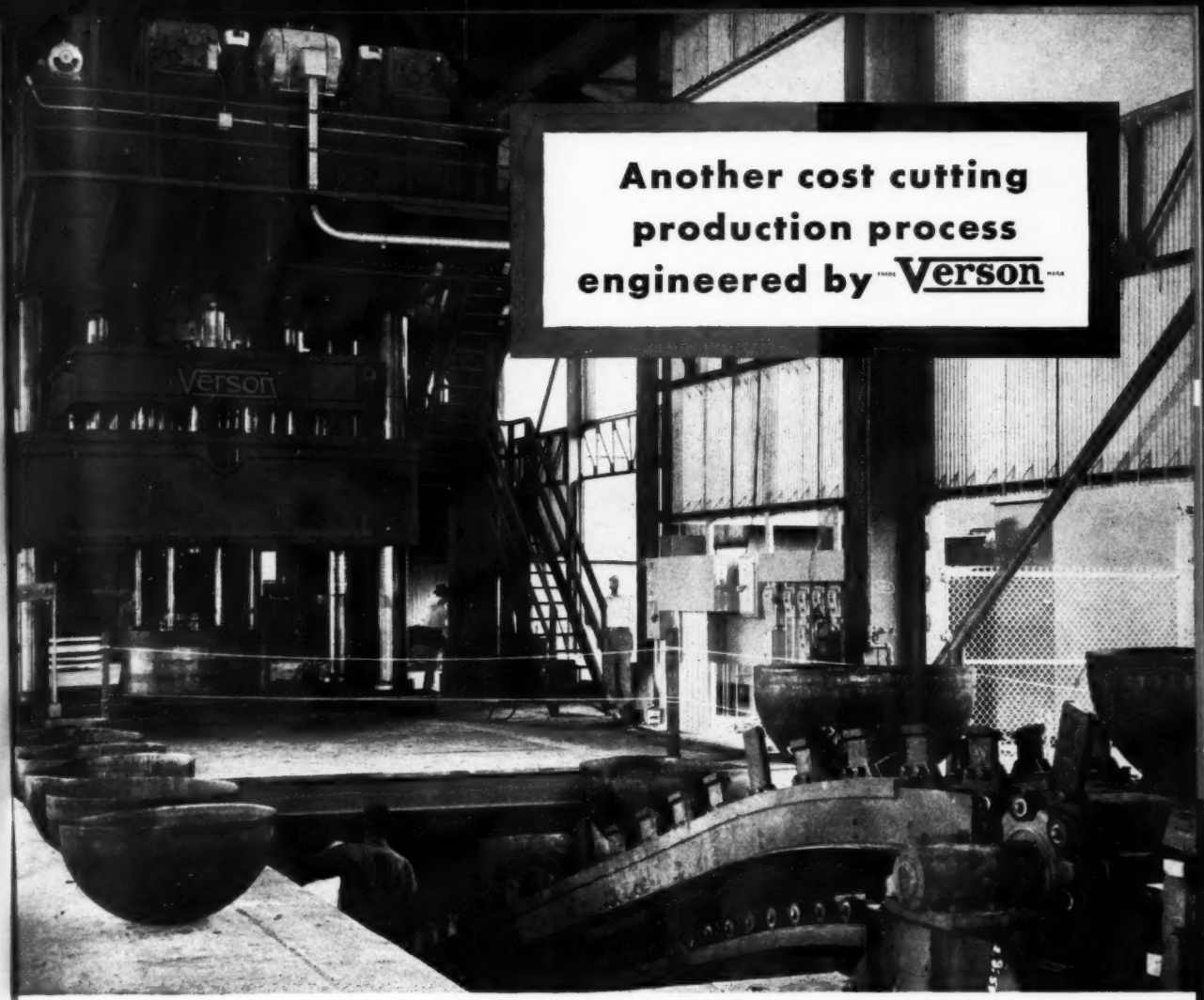

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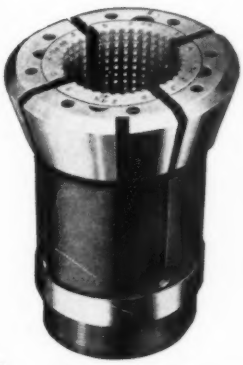

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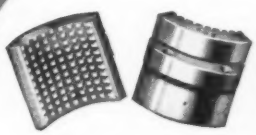

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